ARCHIVES OF OTOLOGY.

NASAL FIBROID.

By HILLIARD WOOD, M.D., Nashville, Tenn.

(*With two illustrations on Text-plate I.*)

FIBROID tumors of the nose are sufficiently rare to justify the report of the following exceptionally severe case.

February 20, 1904, Dr. A. M. Belcher, of Richelieu, Ky., brought to me the case described below.

I. M., aged fifteen years, female, white, apparently in good general health. She gave the following

History.—Two years since the first symptoms developed in the form of pain about the face and forehead, and nasal obstruction. This pain was severe and she remained in bed for three months, being treated for "neuralgia." Later the pain subsided and has not since been a prominent symptom. Nasal obstruction persisted and increased, so that she soon became, and has since remained, a mouth-breather.

During the following months facial deformity began to develop, and has since increased. Hemorrhages, not severe, but of frequent recurrence, have marked the progress of the tumor. During September, 1903, about eighteen months after the first symptoms, the tumor presented at the left nostril, and began to protrude.

Examination.—Patient seems in a general way to be a healthy, robust country girl. The facial deformity is striking and severe. Protruding from the left nostril is a red, firm mass, one inch in diameter, disposed to bleed upon manipulation. All normal contour of the nose is destroyed, the nose being completely flattened, and the "frog face" perfectly developed.

The separation of the eyes and orbits was striking, the pupillary distance which in such a girl should have been about 58*mm*

was 88*mm.* Thus the pupillary distance was increased 1.2 inches. Yet there was no diplopia, or other ocular symptoms.

Just below the left lachrymal sac was an ulcer where the tumor had begun to break through the face. The hard palate on the left side was slightly depressed, and the rhinoscope showed a red mass protruding backward into the naso-pharynx.

Ear symptoms had not been noticed, but the watch was heard at only four inches with either ear. Cerebral symptoms were not, and had never been, present.

A diagnosis of nasal fibroid was made, and an operation agreed upon.

Operation.—The operation was made at the Nashville City Hospital, in the presence of my class. A preliminary tracheotomy was done, through which the ether was administered. The pharynx was next tamponed as a protection against hemorrhage in the rear. An incision was begun below the right inner canthus, carried transversely across the root of the nose to a point below the left inner canthus, thence vertically downward to a point on a level with the nostril, thence to the right into the left nostril. The soft parts being divided, it was found that no bone instruments were needed, as the nasal bones had already separated widely, both from the frontal above, and from the superior maxillary laterally. The above flap being turned to the right, the tumor was brought well into view. It presented as a firm fibrous mass, of a pale pink color, and occupied the space of the nasal fossæ, the antrum of Highmore, and much additional space which it had arrogated to itself.

It was found expedient to remove it in two parts, a wire snare being thrown around the growth about its middle as a protection against hemorrhage, and the anterior half removed by an incision which, in the middle of the tumor, showed a large deposit of calcareous material.

The posterior half was then enucleated by the finger inserted around and behind it.

The pedicle was found to be attached both to the septum and to the roof, corresponding to the upper edge of the vomer and under surface of the body of the sphenoid. This pedicle was cellular rather than fibrous in character, and when torn bled less than might have been expected; in fact, the hemorrhage was only trivial. The pedicle was two inches horizontally and one inch vertically.

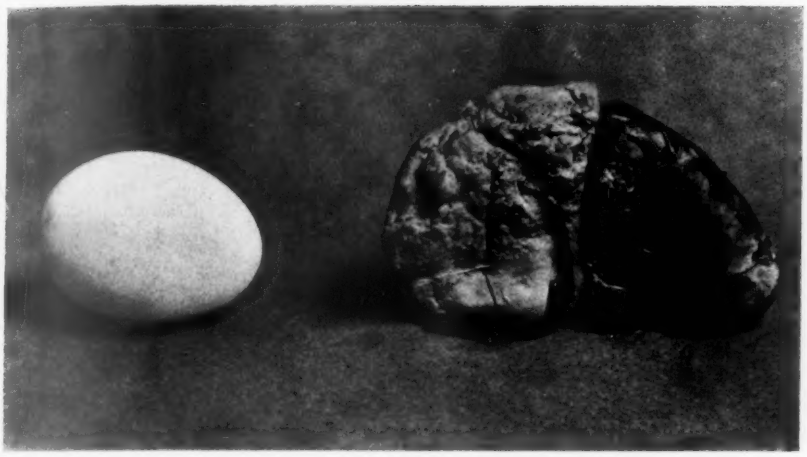

FIG. 1.

FIG. 2.

To illustrate Dr. Wood's case of Nasal Fibroid.

The cavity left by the removal of the growth corresponded in general size and shape to the inside of an ordinary glass tumbler. The septum was, of course, displaced and atrophied by pressure. The outer bony wall of the left nasal fossa, including the inferior turbinal, the lateral mass of the ethmoid and its turbinals, and the inner bony wall of the antrum, had disappeared, there being only a thin shell of bone under the cheek, the concavity of which was filled up by the tumor.

The cavity was packed with gauze and the wound sutured. The operation lasted an hour; the patient had shown marked symptoms of shock, and had been given a pint of normal salt solution into the thigh.

The reaction following the operation was tardy and ineffectual; enteroclysis and hypodermoclysis were several times repeated also strychnine, atropine, and hot-water bottles were used, but the patient continued to sink, and died from surgical shock twenty-two hours after the operation.

The following is the microscopical report by Dr. R. L. Jones, Pathologist to the Hospital:

"The mass is irregularly pyramidal in shape, slightly flattened from side to side, presenting three surfaces and three angles or extremities, the longest of which projected from the nostril, its tip being gangrenous.

"*Size.*—Length, 10*cm*; width at widest part, 6.25*cm*; thickness, 5*cm*; point of attachment oval in shape, 5 × 2.5*cm*; weight, 162 grammes. Has thin capsule, which strips with difficulty; is firm, white, and hard, and cuts gritty, as if it contains bone or calcareous matter.

"*Microscopical Appearance.*—The specimen consists of a network of fibrous connective tissue, with mucous tissue between; blood-vessels numerous; capsule covered with mucous membrane.

"It is probable that the growth began as a mucous polyp, and that the fibrous-tissue growth was secondary, and that the calcareous infiltration occurred later."

REPORT OF A FATAL CASE OF CHRONIC SUPPURATIVE OTITIS WITH CHOLESTEATOMA IN THE DRUM CAVITY AND ANTRUM, CELLULITIS OF ALMOST THE ENTIRE SCALP, THROMBOSIS OF THE TRANSVERSE SINUS, CEREBRAL ABSCESS AND SOFTENING OF THE CEREBELLUM.[1]

By JOHN GUTTMAN, M.D., New York.

I THINK that an additional case of so grave a nature and of such complications as the title indicates is of sufficient interest to be reported before this Society.

History.—J. W., twenty years old, was suffering for the last eight years from a purulent discharge from his right ear. At the beginning of December, 1903, he began to complain of headache, but was still able to attend to his work until the last week in December, when his headache became so severe that he went to bed, and called his family physician, who prescribed some powders. Four days later some swelling appeared behind his right ear, and I was called in consultation on January 3, 1904.

I found the patient, a fairly robust young man, of good family history, lying in bed complaining of intense headache, but otherwise in fairly good spirits. Temp. 101° F., pulse 84; both pupils reacted to light promptly; no stiffness of the neck. There was a slight doughy swelling behind the mastoid plane in the region where the emissary vein emerges; the mastoid immediately behind the ear was neither swollen nor reddened, and only slightly painful to pressure over the region of the antrum. Examination of the middle ear showed a large perforation of the drum mem-

[1] Read before the Otological Section of the New York Academy of Medicine, February 11, 1904.

brane, with a scanty discharge of foul odor and of cholesteatomatous character.

I advised shaving the hair over the swelling in back of the ear in order to determine whether this cellulitis was due to the affection of the ear or to a local cause. On the next day (January 4th) the patient was in the same condition, but the swelling increased towards the vertex of the head. Temperature and headache unchanged. Examination of the interior of the eyes showed right choked disc and left neuritis optica. Vision was: right, $\frac{8}{10}$; left, $\frac{8}{20}$. I immediately advised the patient to be transferred to the New York Ophthalmic and Aural Institute, where on the next day (January 5th) the cellulitis spread downward, closing the right eyelid, and even extending to the left forehead.

Operation.—The patient was put under ether and the usual incision for a radical operation through the skin to the bone was made; this was extended backward for 3″ and upward over the pit of the auricle for about $2\frac{1}{2}$″; a large amount of foul-smelling pus followed the incision of the skin. The entire scalp seemed to be denuded by the abscess, which burrowed underneath; several openings through the scalp were made for drainage. After spending considerable time in the evacuation of the pus, I examined the bone for a fistula, as I was convinced that this pus had its origin inside of the temporal bone. Being unable to find any fistula, I chiselled the bone at the antrum, which contained a slight amount of pus and a good deal of soft, brittle cholesteatous masses; I then chiselled away the posterior wall of the ear canal connecting the two cavities, but I did not consider it wise to do the plastic portion of the operation, as I thought that further intervention might become necessary. In exposing the attic I encountered cholesteatous masses, and after evacuating and clearing these away, I explored carefully the antrum with a thin probe.

In the posterior wall of the antrum, the probe slipped into a fistula leading backwards, and widening this fistula I exposed for $1\frac{1}{2}$″ a soft white tissue which was pulsating, and I was in doubt whether this was dura cerebelli or a softened thrombus of the sinus. As the condition of the patient became very poor at this stage, I thought it best to discontinue the operation for the time being.

On the next day (January 6th), the pyæmic character of the

temperature became more evident; it rose to 105° at 12 P.M., and was 99° at 9 A.M., pulse 84. The swelling of the lids on the right side diminished considerably, but the left eye became closed by œdematous swelling of the lids. The pain in the head was but slightly diminished.

As the temperature and general condition did not improve on the following day (January 7th), the patient was again anæsthetized and the *lateral sinus was laid bare backward almost to the torcular*, and *downward nearly to the jugular bulb*, by taking away the tip of the mastoid. The parietal wall of the sinus was partly sloughed away, and the rest of it was slit open with a pair of scissors; the sinus contained a grayish, brittle, purulent mass, the result of purulent liquefaction of a septic thrombus. As much of this mass as possible was carefully removed with a curette, until a stream of dark-colored blood made its appearance from the posterior portion of the sinus; this was allowed to escape for a few moments, but was finally checked by placing a gauze tampon upon the sinus. By clearing away the septic material from below, slight bleeding also occurred; this, too, having been checked by a tampon, the entire wound was packed with gauze, and the patient put to bed.

On January 8th, the pyæmic temperature (105° at night and 99° in the morning) continued; there was still pain in the head; the œdema of the left cheek had gone down considerably; on removing the dressing, considerable pus gushed out from the wounds in the scalp.

On January 9th, the maximum temperature was only 103° F., pulse 78, the swelling of the face and scalp diminished. Redressed.

On January 10th, the temperature rose to 107°, pulse 84; painful diarrhœa, several rigors, fetid breath, putrid expectoration, and pain in the back appeared. These symptoms pointed evidently to a septic infarction of the lungs and thrombosis of the intestinal blood-vessels. The jugular region was somewhat painful, but there was no cordlike swelling; emphysematous crepitus was felt in the jugular region near the hyoid bone. I now decided to ligate the jugular vein. The patient was again put under ether, and an incision from the angle of the lower jaw along the anterior border of the sterno-cleido-mastoid was made. Several inflamed lymph nodes were encountered and removed. The internal jugular was exposed in the lower carotid triangle; it

was followed upward and ligated where it is crossed by the omo-hyoid; the facial vein was also ligated. The wound was then dressed and the patient put to bed.

On the following day (January 11th), the temperature reached only to 102°, pulse 78; the diarrhœa ceased, and there was no rigor; the wound was again dressed.

On January 12th, the temperature rose again to 105°, and the pulse rate was only 60. Dr. Knapp, who saw the case with me and was kind enough to assist me in all the operations, was of the opinion that besides all the other complications I probably also had to deal with a brain abscess. Not being strongly convinced of this, I thought it best to postpone further interference until the next day.

On January 13th, the temperature and pulse were unchanged, the patient became stuporous and somnolent. The wound was extended upward, and chiselling out a piece of bone over the temporal ridge, the middle cranial cavity was entered, and a small knife was repeatedly introduced deep into the temporal lobe of the brain; liberating more than two ounces of thick, foul-smelling pus. The bone beneath the sinus was then chiselled through and the cerebellar fossa was entered. The introduction of the knife into the cerebellum brought forward only softened brain tissue. Both cavities were packed with iodoform gauze, and while still on the operating table the pulse rose from 60 to 136. Twenty-four hours later the patient died with symptoms of coma and œdema of the lungs.

No autopsy was permitted.

From the history of the case, it is evident that the patient was suffering from a septic thrombo-phlebitis and an abscess of the cerebrum and cerebellum, complicated by a cellulitis of the scalp, all of which originated from a chronic suppuration of the middle ear and cholesteatoma of the antrum and attic. At the first examination of the patient I suspected intracranial complication, but was unable to ascertain whether I had to deal with an epidural abscess, a thrombosis of the sinus, or brain abscess, or a combination of these affections. The symptoms, which I intend to comment upon critically, did not warrant a more definite diagnosis at that time.

The most important and most pathognomonic symptom in

these cases is undoubtedly the pyæmic fever. This symptom alone does not with absolute certainty indicate thrombo-phlebitis, because we may have this same characteristic pyæmic fever, even combined with metastases, occur in osteo-phlebitis pyæmia without sinus phlebitis. Osteo-phlebitis pyæmia is produced by the introduction of septic material into the circulation through the small diploic veins in the temporal bone (1).[1] These cases may recover without any operation on the sinus. In a case of Bezold mastoiditis operated on by me seven years ago (2), pyæmic fever set in, and a metastatic abscess in the form of a deep phlegmon of the palm developed. After some internal medication, and opening of the metastatic abscess, the patient recovered without interference with the sinus.

Schultze (3) reports three cases of osteo-phlebitis from Schwartze's clinic where no surgical operation was performed; in one case a slight operation, such as the paracentesis of the drum membrane, or the opening of the mastoid, aborted the pyæmic fever. Körner (4), Grunert and Zeroni (5), Rimini (6), and others report similar cases of osteo-phlebitic pyæmia that recovered without operation. Therefore pyæmic fever, even when it is accompanied by metastases, can not be looked upon as an absolute diagnostic symptom of sinus phlebitis; in our case, the fever might also have been accounted for by the complicating cellulitis of the scalp.

The next important symptom in the case was the choked disc in the right and the optic neuritis in the left eye. Opinions differ greatly about the pathognomonic feature of this symptom for sinus thrombosis or brain abscess. Zaufal's (7) statement, that the absence of papillitis of the optic nerve is a contra-indication to laying bare the lateral sinus, is positively antiquated. The other extreme opinion of Kipp (8) who says that he has never seen neuritis optica in a pure phlebo-thrombosis can not stand in the light of our present experience.

Jansen (9) found the following relation between changes in the interior of the eye and otitic intracranial complications:

[1] See references at the end of this article.

	Negative.	Hyperæmia of nerve.	Neuritis optica.	Choked disc.
In thrombosis.....(23)	11	2	4	6
" arachnitis..... (9)	2	1	2	4
" brain abscess..... (8)	2	1	2	3
" brain abscess and arachnitis .... (3)		1	1	1

Jansen (10) found in 92 cases these relations as follows: In 52 cases (53.6 %), normal; in 45 cases (46.4 %), there were changes in the interior of the eye; in 19 cases (19 %), slight papillary changes; in 23 cases (23.7 %), neuritis optica; in 3 cases (3.1 %), choked disc. He found changes in the interior in extradural abscess in 18 %, in meningitis serosa in 87.5 %, in cerebral abscess in 29 %, in uncomplicated sinus thrombosis in 44 %, and in complicated sinus thrombosis in 47 %.

On the other hand, there are cases where papillitis nervi optici occurred in an ordinary middle-ear suppuration without any intracranial affection, as was seen by Knapp (11), Fulton (12), and others.

The extensive cellulitis of the entire scalp extending to the eyelids and face was certainly a remarkable feature in the case, and at the same time a rather disagreeable complication. This not only made the diagnosis more doubtful, but also interfered with the treatment, inasmuch as the constant oozing of pus from the abscess above rendered the region of the sinus far from being aseptic. The cellulitis, probably, was only an extension of the small œdematous swelling, which appeared in the posterior part of the mastoid, in the region where the emissary vein emerges. This is called the Griesinger symptom. We have also seen that there was absolutely no swelling or redness in the anterior part of the region of the mastoid, and that the pain on pressure was very slight. It is therefore erroneous to look upon swelling, redness, or even pain on pressure over the mastoid as a criterion of an affection of the antrum and especially of its neighboring regions.

The so-called Griesinger symptom, together with the lack

of swelling in the anterior part of the mastoid, I consider a valuable sign of an intracranial complication, but whether this is always caused by a sinus phlebitis is rather doubtful. In a case of epidural abscess (13) which I operated on two years ago, and where the patient recovered without any interference with the sinus, as its involvement was doubtful, the anterior part of the mastoid was also found normal and the Griesinger symptom alone pointed to an affection of the antrum with intracranial complication.

So extensive a cellulitis complicating septic sinus thrombosis as in our case I found only in a case described by Dunn (14). Pouchelt (15), Stockes (16), Green (17), Wendt (18), Heubner (19), and others consider the erysipelatous swelling of the face, especially of the lids, diagnostic of sinus thrombosis.

The putrid sputum, fetid breath, pain in the back, and the diarrhœa pointed to metastases in the lungs and abdominal cavity. Although metastases occur also in osteophlebitic pyæmia without sinus phlebitis, and in spite of the fact that Körner (20) states that metastases in the lungs are comparatively rare in this affection, still this symptom can not be looked upon as pathognomonic of sinus thrombosis. On the other hand, inasmuch as this symptom develops, as a rule, in the last stages of the disease, its value as an aid in diagnosis must be considered problematic.

The headache is quite an important symptom, but not much stress must be laid on it, as it is only a subjective symptom, and very often some patient in order to arouse sympathy might exaggerate its intensity; and then again it is not pathognomonic for any singular otitic complication, as it may occur in all intracranial affections. Its absence again would not be of very great significance.

The slow pulse which made its appearance toward the end of the disease was a rather strong indication of the necessity to explore the brain. The rise of the pulse rate from 60 to 136, right after the evacuation of the abscess, was a very notable feature. In fact, the slow pulse was the only symptom which clearly indicated to me the presence of an abscess of the cerebrum or cerebellum; all the other symptoms—

the fever, the choked disc, headache, etc.— could also have been brought on by the brain abscess, although the entire picture could easier have been explained by sinus thrombosis.

Brain abscess, in general, unless there are local symptoms such as aphasia, ataxia, etc., is very difficult to diagnosticate, and the diagnosis becomes so much more difficult, or almost impossible, if the brain abscess is complicated, as in our case, with sinus phlebitis overshadowing the symptoms of the brain abscess

In a similar case, where the temperature and pulse ratio would be so disturbed, I would not wait so long to explore the brain. Dr. Knapp was of the opinion that the original and main affection was the brain abscess, and that the sinus thrombosis was only an indirect secondary affection produced by the brain abscess. I held the sinus thrombosis as the main and primary affection, as there was a directly communicating fistula leading from the antrum to the sinus, and all of the symptoms, with the exception of the slow pulse near the end, pointed to sinus thrombosis. I considered the cerebellar abscess as formed directly by continuity from the sinus, and the cerebral abscess by the propagation of septic material through the diseased tegmen.

Let us now consider the treatment of these affections. A conservative expectant plan is hardly justified in cases where suppuration is progressing in such dangerous regions of the human body. It is true, that there are cases reported belonging to this class of affections where an expectant procedure without surgical interference with the sinus led to recovery. Schultze (3) reports three cases of otogenous pyæmia in Schwartze's clinic, where there was quite strong suspicion of an affection of the lateral sinus and the patients recovered without operation on the sinus. In one of the cases the reason that the sinus was not laid bare was that the prognosis was very bad right at the beginning, and still the patient recovered without operation. In another case mere paracentesis of the drum membrane aborted the pyæmic symptoms and the patient recovered. Still, at the present time, the vast majority of otologists consider surgical interference imperative in such cases; they simply differ as

regards the time of action. Grunert (21) says: "The prognosis of sinus thrombosis is so much more favorable, the sooner the case is operated upon."

Holscher (22) is of opinion that there should be no time wasted in waiting.

Schenke (23), who reported nine cases operated on for sinus thrombosis, says: "We do not deny the possibility that some of our cases might have recovered without operating on the sinus, or even without opening the mastoid, still we operated as soon as we thought that the diagnosis warranted it, because we do not care to take the responsibility of endangering the patient's life by metastases or septicæmia by an expectant management."

Körner (20) is somewhat more conservative. He says: "The mode and extent of our surgical interference must always be adapted to existing conditions."

There is much difference of opinion as to the mode of operation, as well as about the question whether the jugular should be ligated or not. Körner (20) believes that the jugular is to be ligated only when there are positive signs of its affection or when there is pyæmic or septic fever. He is not in favor of an exploratory incision of the sinus wall for diagnostic purposes except perhaps by Whiting's method.

Grunert (21) again advocates ligature of the jugular, as this not only cuts off the road by which metastases form, but it is also a preventive against any dangers which might follow an exploratory incision of the sinus wall.

I was prompted to ligate the jugular in my case, because there was unmistakable evidence that septic material was carried by the jugular vein into the circulation.

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REPORT OF A FATAL CASE OF MULTIPLE OTITIC ABSCESSES IN THE TEMPORAL LOBE, WITH REMARKS.[1]

By Dr. C. H. R. JORDAN, New York.

(With Text-Plates I., II., III., and IV. at end of the article.)

THE literature of otitic brain abscess has increased so much of late that it might seem superfluous to make any contributions on this subject. The following case, however, presents some pathological features which invite discussion and which are, perhaps, of sufficient importance to justify publication.

History.—Mr. R. B., thirty-nine years old, was admitted to the New York Ophthalmic and Aural Institute, Nov. 8, 1903.

In his early childhood he had an infectious disease, probably scarlet fever. Since that time he has had a purulent discharge from his left ear. Some years ago he suffered from typhoid-malaria, and he has had recurrent attacks of malaria nearly every year. Besides he had some chronic intestinal trouble and constipation which were attributed to a "floating kidney." With these exceptions he had been in good health and able to pursue his work as a lithographer regularly. His otorrhœa had always been slight and never caused him any uneasiness. Patient considered himself in very good physical condition when his present illness began.

About the middle of September, 1903, he first complained about some pain in the left ear and a dull headache on the same side. A doctor prescribed for him but gave him no relief. On the 27th of September he consulted Dr. W. T. Kudlich in Hoboken,

[1] Read at the meeting of the Section of Otology of the New York Academy of Medicine, February 11, 1904.

to whom I am indebted for the following notes: Dr. K. examined the patient's ear and found fœtid pus in the external canal and granulation tissue in the tympanum. The usual irrigations and applications were ordered. At that time temperature and pulse were normal and no suspicion of any serious illness was aroused. Patient reported at the doctor's office once a week. He seemed to have some relief at first, but his earache returned, his headache became more continuous, and his sleep was not restful. He kept on working but was rather fatigued, sometimes excessively so, when he came home in the evening. On Oct. 31st a moderate rise of temperature was first recorded. Gradually the feeling of sickness and prostration became more marked and the pallid appearance of his face was noticed. About a week before his admission patient had a spell of dizziness, which has recurred quite frequently since. He had evening temperatures to 99°–100°; no distinct rigors were observed.

The pain in the ear became so severe that narcotics had to be given and patient was kept in bed. He seemed rather apathetic at times, but this was ascribed to the effect of morphine and other drugs. On Nov. 4th Dr. R. O. Born, New York, was called in consultation.

He concurred in the diagnosis, "chronic otorrhœa with acute retention," and removed some of the granulation tissue to relieve the retention. Apart from a slight drowsiness, there were no symptoms of an intracranial complication; the eyes were carefully examined and the fundi found normal. A few days later, Dr. Born saw the patient again and found his condition unchanged. He advised a "radical operation," which I was called upon to perform.

On Nov. 7th patient was transferred from his home in Hoboken to the New York Ophthalmic and Aural Institute. When he arrived there in the evening he was so tired and dizzy that he had to be carried up-stairs. He was put to bed and soon fell asleep.

State on Admission.—When I saw him for the first time late the same night he was resting comfortably. He complained of very little pain in the ear, seemed mentally bright, and answered all questions promptly and intelligently. He left his bed unassisted, and walked over to a chair without showing any signs of prostration or dizziness. Right ear was sound and of normal hearing. Left ear was discharging very little creamy, faintly fœtid pus;

there was a large perforation in the *Mt*, the upper part of which was hidden by a mass of very dense granulation tissue. A slight sagging of the adjoining upper and posterior wall was noted. The withdrawal of a probe passed into the attic was followed by a minute quantity of pus. There was no mastoid tenderness, no tenderness on percussion of temporal or occipital bones. No eye symptoms; no motor-paresis. Temperature 100.2°; pulse 88, regular, not very full.

It was considered safe to keep the patient under observation for another day No opiates were given, but the night was passed very quietly. Patient did not feel rested in the morning and had a rather drowsy look. The pallor of his face was more noticeable; his tongue was coated. Temperature 98.2°. Pulse about 80—at times slightly irregular. Examination for ophthalmic and for motor or sensory paretic symptoms was negative. Patient's memory was good, and the search for aphasic symptoms was quite amusing to him. He was glad that he "was not that far gone." The reflexes were normal.

His gait was steady; he could toe a line; he stood up steady with closed eyes, but became dizzy when he turned quickly, especially toward the left side. Then a slight nystagmus was noticed.

During the day patient was very quiet, spoke and complained little, dozed quite a good deal, but was easily roused, and his mind never seemed obscured. He slept during the night, had a little more pain and headache in the morning, but seemed quite bright, and looked cheerfully forward to the operation.

No new symptoms developed.

Our first suspicion of an existing intradural complication remained a mere suspicion, and our diagnosis was: Retention of pus in attic or antrum, pressing against the dura; fistula in semicircular canal.

Operation (Nov. 9th).—The *radical operation* was done in the usual way after Zaufal. The mastoid bone was found sclerosed and extremely hard, and the concussive effect on the brain must have been considerable. As soon as the attic was opened, pus welled out under pressure. About two drams escaped. Attic and antrum were lined with discolored necrotic granulation tissue; there was a large defect in the tegmen, about 12 by 7*mm*, and the surrounding bone was necrosed and partly detached. The dura was covered with the same granulation tissue which lined attic and antrum; after its removal there remained a dark

uneven surface. The dura did not pulsate and did not bulge into the enlarged opening. It appeared stiff and very much thickened; the probe did not penetrate anywhere. The extradural abscess was shut off from the tympanum proper by a dense layer of old granulation tissue which was woven around the carious remnants of hammer and incus. After all granulations had been removed, a carious erosion was seen on the prominence of the semicircular canal. The carious process did not seem to extend backward toward the sinus. We were satisfied that all the symptoms observed up to that time could be accounted for by the conditions found. The operation was completed in the usual way and the wound closed.

Subsequent Course.—Patient passed a more restless night than is usual after radical operations.

When I saw him in the morning he thought his pain in ear and head were just about the same. His drowsiness became more pronounced; although he could be easily roused he quickly lapsed back into his apathetic state. He yawned frequently. Ophthalmoscopic examination showed congested fundi but no distinct optic neuritis. Motor power, sensations, and reflexes were normal; no aphasic symptoms could be elicited. There was some difficulty in passing the urine. Temperature and pulse were about the same as before the operation. Patient slept very little the following night and was very tired and discouraged in the morning. He said he felt himself getting weaker all the time. The ash-gray color of his face was more marked; his tongue was very much coated. He took nourishment well, did not complain of any pain, but seemed rather dull of comprehension at times. Early in the afternoon I found him in a drowsy condition, curled up on his left side with his head resting on his arm. He was not so easily roused as heretofore. The right side of his face seemed to lack tonus and the naso-labial fold was less marked. The grip of his right hand was not so strong as that of the left. Dynamometer, right, 27; left, 28. When told to hold up both arms as long as he could, the right would invariably sink down first. No difference was found between the muscular power of the lower limbs. The cutaneous reflexes were normal, the knee-jerks possibly a little exaggerated. The ankle clonus was easily produced. There was some sensory aphasia; patient could not designate certain objects although he knew their import; at the same time he was able to repeat without failure words spoken

to him. Occasionally he mixed the names of objects, calling a pencil a pocket-knife, etc. The optic neuritis was more marked; the outlines of both discs were hazy. Macewen's percussion symptom could not be elicited. Temperature was slightly above normal; pulse about 80, and not of a cerebral character.

About the presence and the localization of a cerebral abscess there could be no more doubt. It was evident that the encephalitic suppuration was increasing rapidly and that immediate evacuation was imperative. The necessary preparations were made and the patient put on the operating table as soon as the required consent could be obtained. During this time (about two hours) the drowsiness increased to stupor. The slow cerebration and the aphasia became more obtrusive, the speech less articulate. The motor-paresis did not increase perceptibly.

Operation (Nov. 11th). — Under chloroform anæsthesia the wound was opened again, the incision extended upward, and a cross-incision carried backward. The opening at the base of the skull was extended outwardly into the squama, until it measured about 1 inch in length by $\frac{3}{4}$ inch in width. The incision of the dura met with some difficulty on account of its thickness (over $\frac{1}{8}$ inch) and its leather-like toughness. It was necessary to excise a large piece to gain access to the underlying brain-tissue. The latter was pale and soft, and a pulpy mass protruded into the opening. A narrow-bladed knife was then introduced into the temporal lobe about one inch deep in several directions inward, upward, forward, and backward—about three to four times, without bringing pus. A little jelly-like matter resembling pus oozed out through the incision,—it was found to be brain, tissue under the microscope. As we were sure of our diagnosis the knife was inserted again—this time in an extremely backward and upward direction. At a depth of nearly an inch, it struck the abscess and pus welled out. The incision was enlarged with a dressing forceps and nearly an ounce of thin, grayish-yellow, slightly fœtid pus was collected. The finger was introduced into the cavity; no abscess membrane could be detected. In the absence of proper flushing arrangements the cavity was not irrigated. After thorough evacuation it was loosely filled with one strip of iodoform gauze, the wound was dressed, and the patient returned to bed in good condition, with a pulse-rate of 90. Microscopical examination of the pus revealed a mixed infection of cocci and several bacilli; their identity was not determined.

Course after Operation.—Patient slept rather heavily all night and was delirious at times. It was a distinct disappointment to find him on the next morning in the same stupor, with a slightly increased motor-paresis. In the afternoon he moaned some; sighing and groaning were frequent. Pulse was distinctly full, temperature about 100°. There was some difficulty in swallowing. It was thought better to change the dressing and relieve a possible retention or irritation. The removal of the strips of gauze from within the abscess cavity was followed by a slight flow of pus—about one dram. Instead of the gauze-drain, a rubber tube was introduced. The following night was the most comfortable since the day of the first operation, and patient seemed a little brighter the next day. This slight improvement lasted for about two days, while the hemiplegia and the optic neuritis remained the same.

The wound was dressed daily; there was little discharge through the tube. A small prolapse had formed and was slowly growing.

After a more restless night patient complained of an increased headache; on the fourth day after the operation on the brain, it grew worse during the day and became so furious toward night that I decided to make another exploration (Nov. 15th). Pulse was very full. Temperature about 100°.

Patient was put on the operating table; the wound was cleaned and the opening in the dura enlarged with scissors. A scalpel was again introduced in the direction of the former abscess; at a much greater depth than before, a moderate accumulation of pus was found and a longer tube put in. While on the table patient voided urine involuntarily.

He passed a restless night, tossing about in bed. He seemed nauseated, but did not vomit; he hiccoughed a great deal. He was somnolent and difficult to rouse all the next day (16th). At times he was restless and delirious, and left his bed in an unguarded moment. He took nourishment quite well.

The stupor increased on the 17th. Right facial paralysis was pronounced, patient was unable to lift his right arm and leg. Right pupil was dilated; neither pupil reacted to light. Patient had severe hiccough; passed urine involuntarily. Temp. 101°.

A *lumbar puncture* was done and about half an ounce of perfectly clear cerebro-spinal fluid withdrawn. It contained no corpuscular elements, no bacilli. The apparent effect of the

lumbar puncture was quite striking. Patient had a better night, he was more easily aroused the next morning; he recognized some relatives and made an effort to talk. He took nourishment better. The pupils showed some sluggish reaction. There was retention of urine and the catheter had to be used. The temperature remained lower than before.

Patient had another fairly good night, but was decidedly worse in the morning. While being dressed he was very irritable and petulant. He sank into a stupor soon afterward, from which he could be but partially aroused. I changed the dressing again at 10 P.M., and passed a probe in several directions into the temporal lobe without finding any pus. Another lumbar puncture was being prepared. While patient was being turned over on his right side it was noted that suddenly all resistance ceased. He had fallen into a deep coma with absolute motor-sensory paralysis. Both pupils were dilated and rigid. The lumbar puncture was given up, the drainage tube was withdrawn from the brain. There were no convulsions. Temperature went from 99° up to 103.4°. The pulse became weaker, the respiration irregular. Exitus letalis at 2 A.M. Nov. 20th.

Post-mortem Examination.—The calvarium was removed in the usual way, but the dura was not incised. The brain was taken out within the dural sac and put in a solution of formalin. Only the different sinuses related to the left temporal bone were opened and found free from disease. The opening in the dura above and laterally from the tegmen was ¾ inch in diameter, with very much thickened, dark-colored edges. The opening in the skull through tegmen and squama was over 1 inch long, and for the greater part ¾ inch wide; it reached outwardly to within ¼ inch from the groove for the meningeal artery on the inner surface of the squama. The edges were formed by healthy bone; only at the extreme inner and forward end there was still a small rim of carious bone, brittle and discolored on its dural surface; a similar piece was found posteriorly from the outer part of the antrum. From the outer and posterior corner of the antrum, a narrow carious canal led toward the sigmoid groove, ending blindly at the internal table; the latter was still intact and no discoloration was visible on its inner surface. The erosion on the prominence of the horizontal semicircular canal was shallow; no distinct macroscopical changes were visible on the membranous canal. Stapes and stapedius tendon were intact, though im-

bedded in granulation tissue. After the brain had sufficiently hardened (about six weeks later), Dr. M. Allen Starr was kind enough to dissect it. The dura was easily removed; there was no sign of leptomeningitis. On the outer and lower surface of the left temporal lobe was a small prolapse of necrosed brain tissue. The brain was opened by four coronal sections through the temporal lobes. The lateral ventricles were free, the left one being very much compressed, the right one somewhat distended. Most conspicuous in all sections was the enormous enlargement of the left hemisphere and the displacement of the median line toward the right.

The sections through the left temporal lobe[1] show the presence of four distinct abscess cavities and a disintegration of brain tissue extending beyond the border of the temporal lobe into the lenticular nucleus and into the internal capsule and farther up into the median part of the parietal lobe. The three upper abscess cavities have, as serial sections show, no direct communication with each other, but have an outlet laterally leading into the drainage opening. Otherwise they are each entirely surrounded by infiltrated brain tissue (as shown under the microscope), the lateral wall of the upper one being formed by the cortex of the first and second temporal convolutions. These cavities contain merely pus and no detritus. The fourth cavity below and posteriorly is also distinctly outlined, but communicates with the third by a very minute pathway $\frac{1}{3}$ inch long, and contains detritus intermingled with pus-cells. It seems to represent an abscess in its incipiency, set up by an infection which is spreading out at a certain point after it has crept along the narrow channel of a blood-vessel or lymphatic for some distance. About the mode of formation of the other three cavities I have not been able to come to a positive conclusion. I would be inclined to think that the middle cavity represented the original abscess, and that the others formed more or less independently around a focus of advanced septic encephalitis. There is another such

[1] The four plates subjoined to this article illustrate the extensive invasion of the brain by the purulent inflammation in coronal sections, which are parallel and one-quarter of an inch apart.

septic focus in the vicinity of the lenticular nucleus which looks like an abscess in the process of formation; it would have been complete if patient had lived a few days longer.

The pathological conditions, together with the clinical observations, make it probable that the progressive encephalitis started immediately after the mastoid operation. The latter, possibly, was a causative factor in the rapid expansion of the septic process. It has been the generally adopted procedure in cases of suspected intracranial complications to explore the middle ear and its accessory cavities first, and to stop at the dura wherever the conditions found fairly account for the clinical symptoms. But the wisdom of this practice seems doubtful in cases where a suspicion of brain abscess exists. It would seem wiser to keep the patient under close observation until a diagnosis is possible, and then to relieve the retention in ear and cerebrum in one sitting; or, should the retention in the middle ear require immediate attention, it might be relieved in many cases by a simple and gentle operation like ossiculectomy.

In regard to the method employed for reaching and draining the abscess, the way through the very large opening at the base of the skull seemed to present itself as the natural route. Unfortunately the abscess was not situated directly above the tegmen; it seemed as distant from the tegmen as it would have been from the squama, and the much-praised advantage of the mastoid route was lost. Later, when complications arose, a counter-opening through the squama was considered, but given up as futile. The sudden collapse of the patient into the deepest coma was explained by the discovery of an extensive hemorrhage into pons and fourth ventricle. The whole aqueduct was distended, the ventricle filled with blood. Numerous minute hemorrhages were scattered throughout the pons.

In the literature I have found only two somewhat similar occurrences mentioned in cases of cerebral abscess. In a case reported by Röpke (ARCH. OF OTOL., 1901, p. 27), the corpus striatum was "full of minute hemorrhages without any other changes in the vicinity." Preysing (*ibid.*, p. 33)

FIGURE II (section through the anterior part of the temporal lobes just in front of the auricle) shows the enlargement of the invaded hemisphere and the compression of the other, the infiltration of the temporal lobes, and the compression of the cortex.

FIGURE III.—Beginning disintegration of the temporal lobe, extending into the thalamencephalon and parietal lobe. The out-

FIGURE III.—Beginning disintegration of the temporal lobe, extending into the thalamencephalon and parietal lobe. The out-

Arch. of Otology, XXXIII.

FIGURE IV shows the three upper abscess cavities and the complete disintegration of the surrounding tissue, including the lenticular nucleus and the internal capsule.

FIGURE V.—A fourth abscess cavity is seen in the lowest part of the temporal lobe. The left lateral ventricle was not invaded, but compressed

found a hemorrhagic area, 12 by 2 by 4*mm*, in the crus cerebri. Both were cases of a diffuse abscess; the cause of the hemorrhages is not commented upon. In a case of cerebellar abscess reported by Dr. E. B. Dench (*Transact. Amer. Otol. Soc.*, 1903), a hemorrhage occurred into the spinal canal. These hemorrhages cannot be mere coincidents, but must be due in some way to the suppuration in the brain. The only explanation I can suggest is that the septic or toxic matter may affect and weaken the walls of blood-vessels through which it is carried away. The possibility of such a hemorrhage would be another important reason why patients with encephalitis should be handled with the utmost gentleness.

FIGURE V.—A fourth abscess cavity is seen in the lowest part of the temporal lobe. The left lateral ventricle was not invaded, but compressed.

THE EAR OF THE SPERM WHALE AND SOUND CONDUCTION.

By Dr. GEORGE BOENNINGHAUS, Breslau.

Translated by Dr. W. S. Bryant, New York.

AN essay by me will appear in one of the next volumes of the *Jahrbücher der Zoologie*, on "The Ear of the Sperm Whale, a Contribution to the Theory of Sound Conduction." This paper is a continuation of one on the "Pharynx of the Phocæna Communis," which has already appeared in vol. 17 of the *Jahrbücher*.

I have attempted to explain the remarkable changes which the whale, originally a terrestrial animal, had undergone to adapt it to marine life. This paper contains many anatomical and physiological details which, so far as the ear is concerned, I discussed at the Tenth German Otological Congress, at Breslau. The facts of special interest to the otologist, namely, the physiological conclusions which we are able to deduce from the anatomical structure of the sound-conducting apparatus of terrestrial animals, but more especially of the whale, were only briefly commented on at that time, partly because of the short time allowed, and partly because the investigations were not sufficiently advanced.

I wish to make a short resumé of all the points concerning sound conduction, because the journal in which this paper appears is not accessible to many otologists who are interested in this chapter of physiology. I will preface my remarks by saying that the anatomical findings alluded to were mostly gotten from the *Phocæna communis*, a small

whale, only two metres long, which is a denizen of the North and Baltic Seas, and therefore easily obtained.

We are to-day more than ever undecided as to the way in which sound conduction reaches Corti's organ, in spite of a great amount of laborious anatomical and physiological investigations on the normal and pathological human and mammalian ear. Comparative anatomy has been less consulted, yet it is just the field in which Nature provides the greatest help in questions of sound conduction if the findings can be correctly interpreted.

I.

Of the many subjects which would seem to be of value for study, there is none more fruitful than the ear of the marine mammals in general, and particularly that of the whale, which is the most specialized of the aquatic mammals.

The whale, in all probability, at one time had an external ear, as the seal now has; that is to say, an auricle in the form of a tube rolled up and completely drawn under the skin, where it lies parallel to the surface, and during the submerged existence it is simply shut off, water-tight, but on rising to the surface the ear is opened by muscular action for the reception of air sound waves. As the whale remained permanently in the water, his body adapted itself to hydrostatic conditions in such a manner that, even when floating on water, the external ear remained below the water line, and the whale had no further occasion to open his auricle. The musculature and the cartilaginous framework of the external ear became rudimentary, the external ear obliterated, and the part of the auditory canal near the drum membrane became filled with desquamated epithelium. In this way, the drum membrane and ossicles lost the faculty of being set in motion by sound waves, and the ossicles became ankylosed by synchondrosis with one another and with the oval window, in the same way as any joint will ankylose which has been artificially immobilized. In this case, the other motive power of the ossicles, namely, the contraction of the tympanic muscles, was not sufficient to check this ankylosis.

These retrograde changes are unimportant and are common to all organs bereft of their normal function, and we might have been led to believe that these changes are the only ones that would be encountered in the whale's ear, because there was no further need of alteration in the ear for hearing under water. We know that when we have our ears under water, all those sounds can be easily heard which originate in the water, and upon the hearing of which by the whale Nature has laid special stress, as conduction of sound waves in water to the labyrinth is extremely good. In reality, however, the conditions are very much more complicated, for we find a series of striking changes in the whale's ear, whose functions must be to conduct sound to the labyrinth in a very definite way. The purpose of these changes is evidently to improve hearing. The following points must be considered:

1. A provision is made that the sound waves of water shall not be conducted to the labyrinth from all sides, otherwise this would have the effect of weakening the sound through interference, and so impair the hearing. This is accomplished: (*a*) by acoustic isolation of the labyrinth; the bony labyrinth is separated from the rest of the cranial bones, not by diploic material, which does not occur in the whale's skull, but by air cavities connected with the tympanum; (*b*) by preventing any possible resonance of the column of air included in the tympanum, which, according to J. Müller (Müller's submerged fish-bladder experiment), would occur very easily, and which would also, on account of the interference in the labyrinth, prevent acute hearing. Dampening the resonance is accomplished by the presence of a large soft structure in the tympanum, which originated by hyperplasia of the tissues surrounding the internal carotid artery. We may here remark that in the whale the carotid passes through the tympanic cavity in an obliterated condition.

2. A special way is provided to conduct the sound waves of the water to the oval window. This is accomplished: (*a*) by a considerable thickening and increased density of the ankylosed ossicles, a fact which is specially noteworthy,

because it seems to be in opposition to the principle of a general diminution of the bony system of the whale to lessen his specific gravity; (*b*), by the formation of a peculiar funnel-shaped bony depression on the surface of the bulla, to the apex of which the thickened and very dense processus folianus of the hammer is attached. This funnel, like a hearing-trumpet, serves to collect the sound waves in the water, and conducts them along the ossicular chain to the oval window; it apparently is a functional substitute for the lost auricle.

The whale's ear shows with singular distinctness that the oval window is predestined for the entrance of sound waves into the labyrinth. Furthermore, the whale demonstrates how sound conduction passes from the oval window (the stapedial foot-plate) to Corti's organ. When the sound wave in the whale reaches the foot-plate of the stapes, it can reach Corti's organ in two ways: the first is that the waves pass from the stapes laterally through the bony labyrinth capsule, which on account of the ankylosis of the stapes is more important in the whale than in terrestrial mammals. We cannot, however, consider this as the chief way for sound conduction, but as a sort of additional pathway of less importance, but by no means insignificant. According to Savart's experiments on plates which touch at an angle, the molecules of the labyrinth capsule would have to vibrate in the same direction as the stapes and the rest of the ossicles—that is to say, in a frontal direction. As the axis of the cochlea in the whale does not lie horizontal, as in man, but vertical, the sound waves passing through the labyrinth in a transverse plane would strike the basilar fibres partly at right angles with good result, and partly longitudinally with poor result, which, together, would cause an uneven excitation of Corti's organ, which seems very unlikely. Not less important is the observation that the bony labyrinth capsule is connected with the bulla by bony union at its extreme lateral edge. The sound waves which fall laterally on the bulla and labyrinth capsule will at once pass through the labyrinth capsule in the direction which we have just shown to be unfavorable. If these sound waves were

intended for normal excitation of Corti's organ, the improvement of sound conduction to the oval window, by the contrivance of the sound funnel of the bulla and the thickening and sclerosing of the ossicular chain, would be entirely superfluous, and the whole mechanism would be inexplicable.

The chief path for sound conduction in the whale remains from the foot-plate of the stapes directly into the vestibular fluid, as in land mammals. This seems to be the more probable way, because the vestibule is situated in a direct prolongation of the stapes, and would, on this account, receive the main impact of the sound waves. Naturally, in view of the fact of the ankylosis of the stapes, and on account of the complete filling up of the niche of the round window of the whale by tissue, the vibrations of the basilar membrane can only be excited by molecular movement. It seems to me to be most necessary to accentuate this, because we meet an opinion here and there that vibration of the basilar membrane is impossible in a completely closed labyrinth, a view which Kayser had disproved by experiments with his water telephone.

We have still to consider how sound conduction takes place in the labyrinthine fluid of the whale. The vestibule of the whale has also undergone a remarkable change. It is no longer ampulliform, as in other mammals, but tubular, about as wide as the scala vestibuli, of which it can be considered a distinct prolongation. It is bent, like the cochlea, only in an opposite direction, and is in such a position that the vestibule makes about one turn, while the cochlea makes about one and a half. The oval window constitutes the beginning of the vestibular tube and is closed by the immovable foot-plate of the stapes. The propagation of sound in the vestibular and cochlear tubes must necessarily be the same as in a speaking-tube filled with water, and doubly bent in reverse spirals. We cannot say with certainty, whether reflection is as favorable in a speaking-tube thus filled with water as in one filled with air, because several physical conditions are wanting. It is, however, probable that the conditions for sound conduction are favorable, and it is certain that they become more favorable the denser the

walls of the sound-tube are. I am inclined to consider the improvement of reflection, not only in whales, but also in other animals, as the reason for the density of the labyrinth capsule in general. The reason for the transformation of the vestibule in the whale must be left for later.

It is natural to ask why Nature has made such great efforts to adapt the ear of the whale for life under water. Remembering that the sperm whale has entirely lost the sense of smell, that feeling and taste are but little developed, we will be able to value the significance of hearing for the whale as a means for orientation. The whale also has an eye just as perfectly adapted to aquatic life. What is there for the whale to hear under water? First of all, there are sounds emanating from himself, the sound of blowing, which is characteristic for each variety of whale, and which is conducted to the water by the vibrations of the air passages. Other sounds are the thrashings of his tail, which are like the motions of a propeller; and finally his voice, such as it is in the whale. By the sounds the whales are able to collect and keep together with the aid of their ears. The ear also warns the whale of dangers, especially of the common enemy, the narwhal, which betrays its proximity by sounds. The coast line, the special enemy of large whales, would make itself noticeable to the ear by the booming of the surf.

II.

The whale demonstrates the following principles of sound conduction with unmistakable clearness.

First, the conduction of sound to the labyrinth takes place through the ossicular chain; *second*, the sound conduction in the labyrinth takes place through the labyrinthine fluid and by its molecular movement. Our further observations are intended to prove that there is no reason to assume that sound conduction in mammals and man takes place according to any other fundamental principles. Sound waves of air, just as those of water, can reach the labyrinth from every part of the surface of our heads. "The bones conduct the air, the membranes conduct, the ossicles conduct, everything

does what it cannot avoid" (J. Müller). It is only a question which way is the best for sound conduction, and to this way we will ascribe the selection of the principal sound conduction. The other ways we will consider are unavoidable but of less importance.

If we stop our ears, our hearing is much impaired, which proves that the external auditory canal is the main road for sound conduction. We do not, however, find in terrestrial mammals and man such attempts to close all the other ways for sound conduction as we see in the whale. This is easily explained, because the necessity of lessening interference of sounds is not as necessary for terrestrial as for aquatic life, and because the transmission of the sound waves of the air through the cranial bones is much more difficult. All the air spaces which surround the labyrinth, the tympanum, the mastoid, and other air cells serve, as in the whale, for acoustic insulating contrivances. Another acoustic insulator is the dense labyrinth capsule, which, although it aids the propagation of sound waves which have reached it, nevertheless checks their direct reception. Another reason for the density of this bone is the elimination of interference. The irregular structure of the tympanum acts as a check to the resonance of the air in the tympanum, otherwise stalactitic projections and septa act in this manner.

There are three possible roads for sound conduction from the auditory canal and drum membrane: 1st, the conduction through the tympanum and promontory; 2d, through the round window; and 3d, through the ossicular chain and the oval window. Formerly the last way was considered the special road for sound conduction; now, however, the other two ways have also been so regarded (Zimmermann, Secchi). Irrespective of the whale's ear, comparative anatomy demonstrates that only in the minority of terrestrial mammals does the promontory and round window lie in such a favorable relation to the external auditory canal as in man, upon whose ear these opinions are founded. Among these animals, with an unfavorable arrangement of parts, we find some possessed of the most acute hearing, namely, the predatory animals.

Taking all in all, there remains for us, by exclusion, only the way through the ossicular chain and oval window as the special sound-conducting path, which naturally does not exclude the fact that the ossicles, besides their ability to transmit sound, have other functions on account of their connection with muscles, namely, the power to regulate sound, which is still under discussion. According to von Helmholtz's careful computation, we must ascribe to the drum membrane and ossicular chain, judging from their construction, the ability to transmit with great energy even faint sound waves to the labyrinthine fluid by mass vibrations, which is a very difficult task. On account of the delicacy of the movements and our incomplete apparatus, it has been impossible as yet to demonstrate a massed vibration of the apparatus under the stimulus of a faint sound. It has been lately proven (Mader with the microphone, Nuvoli with the auto-stethoscope), that the vibrations of the apparatus are mostly molecular, such as any other solid takes up. There remains only to determine whether it is these molecular vibrations which produce the excitation of Corti's organ, when they are conducted to the labyrinthine fluid. Against this conclusion, we have the whole anatomical plan of the ossicles—that is to say, their articulation and their delicacy — which, in many animals, extends to the utmost possible limits, and, further, their medullary structure. All these facts tend to a reduction of their conductive power; and finally, the unequal length of the crura of the stapes conduces to sound interference in the foot-plate. Although the more delicate phenomena occurring in the ossicular chain during the process of sound conduction have not yet been demonstrated, we cannot doubt the great importance of the drum and ossicular chain in connection with sound transmission, since the phonograph and telephone have shown to what a high degree a tense membrane is able to receive sound and to give it up again.

An explanation of sound conduction in the labyrinthine fluid, that is, from the foot-plate of the stapes to Corti's organ, offers greater difficulty in man and terrestrial animals than in the whale. The excitation of the latter organ by

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sympathetic vibration of the fibres of the basilar membrane, according to von Helmholtz, is still the only theory with which we can work, because it is founded on the anatomical structure of Corti's organ, which is composed of evenly stretched strings, gradually increasing in size.

The chief question under debate is, By what kind of motion are the basilar fibres put in vibration by the labyrinthine fluid,—whether by mass movement or molecular movement? This question remains unsolved. Von Helmholtz himself has expressed no opinion on the subject, but it can be inferred that he had molecular movement in mind, because he bases his theory on the phenomenon of sympathetic vibrations which is a phenomenon of molecular forces.

If we wish to continue in our investigation of this question, we must first determine what kind of motion is produced by the impact of one body upon another. An impact upon a body of air produces both a mass movement and a molecular movement. A massed movement can be demonstrated by filling the air near the impinging body with smoke, and by observing its movements. The molecular movement, on the other hand, will become evident by the production of sound, provided the impact is repeated with sufficient frequency. If a vibrating tuning-fork is immersed in water, we will observe complicated movements near the fork called "waves." These are mass movements. The molecular movement, however, in the shape of sound, is propagated far beyond the undisturbed water. Aside from the fact that the former movement is visible, and the latter audible, the mode of propagation of the two movements is widely different. The water waves travel with a variable speed, dependent on the conditions, but always slow enough to be visible (Weber Brothers). Sound waves, however, travel through water at a constant speed of 1436 metres per second.

The vibrating stapes, impinging on the labyrinthine fluid, produces the same double movement as the vibrating tuning-fork immersed in water. It must be very simple if the drum and chain of ossicles are set in motion by a simple tone; but it must necessarily be exceedingly complex if it is excited by a complex tone. We cannot form a very defi-

nite conception of the complexity of these movements, but perhaps can arrive at a better understanding by a comparison with the phonograph.

If we speak into the receiver of the phonograph, both the plate and the style connected with it are set into mass vibrations. The style impinges on the cylinder, and carves out of its soft mass the well-known complex furrows; in other words, the style performs a mass movement upon the cylinder. The molecular movements which the impinging style must produce in the wax could be perceived as sound were it possible to place the ear against the cylinder, or if Mader's ear microphone were used. We could make an experiment analogous to the experiment with the resounding tuning-fork, if instead of resting the style against the cylinder it were immersed in water. It would then be possible to see even a minimum displacement of the water near the pencil and to easily hear, with Kayser's water telephone, the sound transmitted into the water.

The question which next occurs to us is, By what form of movement are the basilar fibres brought into vibration? Viewed from the standpoint of molecular movement, it would be readily understood according to the well-known phenomenon of the sympathetic vibrations of the strings of an open piano, after calling into it and from which the damper has been removed. The theory of mass vibration would explain a simple tone, but not a mixture of tones. Finally, the fact that the basilar fibres of the whale are made to vibrate by molecular movement, confirms the theory of molecular movement as existing in land mammals and man. If the transmission of sound through the phonograph and the drum excite the same movements in the cylinder and labyrinthine fluid respectively, the difference between the two apparatuses would seem to be entirely in the application of the forces; thus, the phonograph utilizes all the massed movement excited by the style on the cylinder, but neglects the synchronously produced molecular movements. The ear, however, utilizes the molecular movements generated by the stapes in the labyrinthine fluid, and discards the synchronously produced massed movements of the latter.

After these introductory remarks, based on physical experiments, we may now turn to the question of how we can picture to ourselves (1) the course of the molecular movement in both animals and man, and (2) the course of the mass movement of the labyrinthine fluid.

(1) The molecular movement will penetrate into the cochlea with greater difficulty than in the whale, for in the whale the oval window and the entrance into the cochlea are situated at the end of the tube-like vestibule. In terrestrial mammals and man, both openings are situated on the external side of the ampulliform vestibule. The principal sound wave proceeding from the stapes-plate can not reach the cochlea by total reflection as in the whale, but only by partial reflection, from the mesial side of the vestibule, against which the main sound wave first impinges. In any case, the sound reaches the cochlea with greater loss of energy than in the whale.

The conditions, with the stapes in the erect position, are unfavorable even for the partial reflection of the principal sound waves from the mesial wall of the vestibule to the entrance into the cochlea, because the entrance is situated below the oval window, and the mesial wall is divided in such a fashion, into the recessus ellipticus and the recessus hemisphericus, that the middle line of the stapedial foot-plate lies opposite the shelf of bone separating the recesses. The reflection must necessarily become more favorable if the stapes-plate lies obliquely, looking downward or forward. A more exact investigation of these conditions can be carried out on an accurately enlarged model. The obliquity of the stapes-plate downwards, which, according to von Helmholtz and Henke, accompanies every inward movement of the drum, can be produced by sound striking the drum, and also by contractions of the tensor tympani. The obliquity forwards is caused by the stapedius muscle. In this manner, by the combined function of the tensor and the stapedius muscle, the stapes-plate may be adapted voluntarily for the maximum of the reflection in the vestibule. This voluntary adaptation is called "listening." In former times, the stapes was called the "harkening muscle," because it was

said that watchful animals, in harkening, turned the concha toward the sound, and as the muscles of the concha and stapedius are innervated by the facial nerve, in all likelihood a contraction of the stapedius takes place simultaneously with that of the muscles of the outer ear. Recently Ostmann has proved convincingly that the stapedius contracts in the dog while harkening. The tensor and stapedius may therefore be regarded as muscles of accommodation, but not in the former sense that these muscles adapt the tension of the drum and the pressure in the labyrinth to the tone to be perceived. The fixation of a sound by the ear, the fixation of an object by the eye, are thus analogous processes which are accomplished by different physical means: on the one hand, by a change of reflection; on the other, by a change of refraction; in both cases, by muscular effort. I believe, therefore, that sound conduction in the labyrinth takes place with equal precision to light conduction in the eye, and we will understand this more easily when we bear in mind that sound conduction is subject to a large extent to the same laws as is light conduction.

This entire reasoning may savor too much of theory. We have been led to it by comparative anatomy. The only plausible explanation of the tubular reconstruction of the vestibule of the whale is that after the loss of the mobility of the stapes-plate delicate hearing would have been impossible for the whale in the presence of an ampulliform vestibule, and that this transformation into the tube-form attempts to correct this defect. The only difference is that in the whale reflection is focussed to the maximum, independent of the will, while in terrestrial mammals and man it is a voluntary function.

(2) The motion of the stapes-plate is, theoretically, both a lever and a piston movement, which, in reality, are combined. The lever motion takes place on a vertical or horizontal axis, and results in the above-mentioned obliquities of the stapes-plate. If we consider one of the lever motions and assume that the axis upon which the movement occurs is the fixed one and that this axis divides the stapes exactly into two equal parts, then there will be, with every

movement on this axis, as much of the stapes-plate to project on one side as is pushed in on the other. In this manner, there is never an increase in the volume of the contents of the labyrinth, and no reserve chamber is required for the displaced labyrinthine fluid. The mass movement of the labyrinthine water which ensues is a simple backward and forward flow between the two halves of the stapes; it is not a wave movement, because a free surface of the fluid is necessary for waves, which is here wanting.

For the piston-movement of the stapes foot-plate an overflow chamber is necessary, because water is practically incompressible. The necessary yielding is supposed to be furnished by the membrana rotunda since the time of Ed. Weber. Let us consider that the lamina spiralis ossea joins the lateral labyrinthine wall, then the movement of the fluid, resulting from the piston-movement of the stapes, will proceed, without a doubt, from the foot-plate to the entrance into the scala vestibuli, then up the scala vestibuli and finally through the helicotrema into the scala tympani—as was shown by von Helmholtz. This movement is not, moreover, a wave movement, but a flux and reflux. The area of the helicotrema is considerably smaller than the surface of the foot-plate, and if there were no other possibility of escape for the fluid than this one there would be considerable resistance-opposing movements of the foot-plate on account of the smallness of the helicotrema. This does not seem to be in accord with the facile vibration of the ossicles required in faint sound conduction. There must, therefore, be a second place for escape. The aqueducts cannot, generally speaking, be considered, as they offer too great resistance on account of their narrowness and length. We can consider therefore only the membranous part of the ductus cochlearis. The membrana Reissneri is but slightly tense and is easily pressed in. The basilar membrane, however, has not this quality, because its rough chords are strongly stretched, as can be inferred from the strength of the tension apparatus, the ligamentum spirale, whose fibres, for the greater part, converge towards the basilar membrane. Under these circumstances, the piston-movement of the

stapes would cause yielding of the membrana basilaris against the scala tympani, if there were no other mass in the ductus cochlearis more easily displaced than the basilar membrane. This mass I consider to be the blood in the capillaries of the stria vascularis, which is so superficial as to be easily compressed. We must therefore ascribe to the stria, besides its own function of supplying lymph for the ducts, the function of providing easy movement for the stapes because of its ready compressibility.

From this it is clear that the mass movement of the labyrinthine fluid has no effect upon the basilar membrane, and that molecular movement alone causes the vibration of the basilar fibres, which must be of the greatest advantage for the exact vibration of the strings of an instrument made on the pattern of Corti's organ.

In conclusion, I wish to make a brief observation as to how this theory, proceeding from comparative anatomy, must explain the pathological changes in sound conduction of the human ear. We are concerned especially with an explanation of increased bone-conduction. If the conduction from the rim of the oval window to the stapes-plate is improved, whether by increased tension of the annular ligament, by retraction of the drum, or by interference from an exudate by fibrous or by bony ankylosis, sound conduction from the bones of the cranium to the stapes-plate is naturally improved, as we have just shown that the stapes-plate is to be considered the place from which the excitation of Corti's organ proceeds with the greatest ease, then improved hearing for bone-conduction follows an easier transmission of the sound waves from the bone to the stapes-plate. This finds its expression in the increased duration for hearing a tuning-fork placed on the skull. This more or less agrees with the explanation of this phenomenon given by Bezold and others.

OPERATIVE OPENING OF THE MASTOID BONE IN OTITIS MEDIA PURULENTA WITH EXTENSION OF THE DISEASE BENEATH THE MASTOID PROCESS.[1]

By Dr. FERDINAND LEIMER.

Abridged Translation by Dr. Julius Wolff, New York.

DURING the period from 1892 to 1901, ninety-seven cases of acute middle-ear suppuration with complications were observed, which required operative opening of the mastoid bone. Among this number there were 17 cases in which the disease spread underneath the mastoid process.

This form of mastoid disease was first described in 1881 by Bezold, who gave to it the character of a well-defined clinical picture, and, furthermore, showed that this form of pus burrowing occurs almost exclusively in the acute middle-ear diseases.

The sexes were represented in the 17 cases as follows: 14 males and 3 females. Whereas, in the ordinary form of mastoid disease there is a well-known ratio of about 6 : 4 in favor of the males, the preponderance of the latter sex is even more pronounced in the cases with burrowing.

A comparison of the ages at which mastoiditis and Bezold's mastoiditis preferably occur, shows that the former most frequently occurs during the first three decades of life, while the latter is found most frequently in the third, fourth, and especially the fifth decades. The cause for the absence of the burrowing processes during childhood and for their

[1] Report of seventeen cases from the Royal University Ear Clinic, Munich.

frequent occurrence at later ages, is to be found in the anatomical conditions that will be described later.

The time which elapsed from the appearance of the first signs of ear inflammation till the operation was in 2 cases less than one week, in 10 cases three to thirteen weeks, and in 2 cases six to seven months. The early period at which the first 2 cases were operated upon was fully justified by the menacing conditions that were found. All the patients had to be operated upon within a very short time after their admission to the hospital.

In 5 of the cases the patients were unable to designate a cause for their ailment; in 3 of them a nasal catarrh was mentioned, and in 1, tonsillitis. Other causes assigned were erysipelas, traumatism, bathing, douching of the nose, and snuffing tobacco.

The hearing was tested in all cases immediately before treatment was begun, showing that in 4 cases whispered voice could be heard at 4 metres; in 4 others, at 20 to 60 centimetres; in 2, at 10 to 20 centimetres; in 5, at 1 to 10 centimetres; and in 2, not at all.

The external canal, drumhead, and tympanic cavity presented in general the same appearances as in mastoiditis. In no less than 5 cases there had never been a discharge from the ear, and in 4 of these paracentesis was performed, with resulting muco-purulent discharge. Among the 11 cases which perforated spontaneously, there were 6 in which the canal was almost occluded by swelling of the upper-posterior wall.

The mastoid portion and its surroundings presented in most cases the well-known characteristic appearances. The greater portion of the mastoid region usually remains more or less free from swelling and tenderness. The latter, together with redness and pain, generally only begin below the oblique line of insertion of the muscles at the mastoid process, from there extending to the region below the mastoid process and more or less completely filling up the retromaxillary fossa. The inflammatory process sometimes even extends backward as far as the median line and, in the most pronounced cases, down to the upper dorsal vertebræ.

It is rare for this board-like infiltration to break down and form a superficial abscess at some remote point. In two of the cases the only swelling noticeable before the operation was at the usual region above the insertion of the muscles; but in six and fourteen days, respectively, after the operation tenderness and swelling appeared below the mastoid process, which increased to such an extent that counter incisions became necessary. In the remaining cases the swelling below the mastoid was present before the operation, at times even filling the retromaxillary fossa, whereas the region over the mastoid was normal and free from tenderness.

The time at which the swelling below the mastoid process appears may vary from a few days to several months after the onset of the first acute aural symptoms. The important factors in this respect are the size and position of the pus-containing cells, of which those located at the tip and to the inner side of the same most favor perforation downwards. Another factor is the thinness of the walls of the cells that lie at the lower surface of the mastoid, and finally there is the presence of pre-existing dehiscences in this wall.

The general symptoms of which the patients complained were pains in the head as well as in and below the ear, fever, with more or less severe chills or pyæmic symptoms, and rigidity of the neck.

Changes in the background of the eye were found only twice, and then were only slight.

Sufficient indication for operative interference in cases of acute middle-ear suppuration, with extension of the process underneath the mastoid, is given by the presence of the characteristic diffuse swelling which more or less completely masks the outlines of the mastoid process. Other indications for operation were found in severe and prolonged febrile conditions, in fistula at the floor of the external canal, and the long duration of the middle-ear disease.

The opening of the mastoid bone is begun by applying the chisel low down at the very tip of the mastoid process, thereby at once separating and removing the insertions of the muscles attached to it. Hereupon, the outer cortex is removed, the antrum exposed or rather opened at its

posterior end, and, finally, the rest of the mastoid process is removed. The result is a large defect in the mastoid portion extending above and anteriorly into the antrum and bordering below on the soft parts subjacent to the mastoid process.

Often there may be large cells filled with pus and granulations extending inward beyond the mastoid groove, so that it may be necessary to push forward to the jugular bulb, which, however, must not be injured.

Finally, the periosteal elevator is pushed in above the soft parts underneath the base of the cranium, in order to empty any pus cavities that may be situated here. The procedure often suffices to bring about healing, for with the opening of the mastoid bone the source of the pus has been exposed. But when there are larger accumulations of pus deep in the soft parts, the indication is to push the elevator underneath the muscles to the lower end of the abscess and at this point to make a counter-incision.

The condition of the soft parts in our 17 cases presented almost a uniform appearance, inasmuch as in 15 of them there was a more or less extensive swelling underneath the mastoid process, while the soft parts over the mastoid bone were unaltered. In the other 2 cases the soft parts underneath the process were normal, whereas there was a large fluctuating tumor behind and above the auricle. In both these cases the burrowing of the pus downwards did not occur until after the operation.

The outer bony surface of the mastoid portion was found unchanged in 12 of the cases, while in 4 there was a fistulous perforation of varying size. This perforation of the cortex is caused by the gradual excentric enlargement of the cavities in the mastoid through absorption of the lime salts in the bone surrounding the pus-containing cells.

In opening the mastoid with the gouge, it was repeatedly observed that the outer wall was dense and compact, while the walls of the underlying cells were thin, shell-like, and fragile. This circumstance readily explains why in such cases perforation takes place at the inner surface of the process.

The contents of the cell-spaces consisted in 13 cases of

pus and granulations, the latter being present mainly in the cases of long duration. The bacteriological examination of the secretions removed from the pus cavities in this form of mastoid disease revealed in most cases the diplococcus pneum., while some showed streptococcus pyog., and even staphylococci.

Bezold has repeatedly drawn attention to the fact that the large preformed cell-spaces in the mastoid bone afford, so to speak, an anatomical predisposition to the formation of empyemas of the mastoid. More especially do the terminal cells, which gradually increase in size towards the periphery of the mastoid, predispose to the collection of pus; for, being situated low down and far from the principal cavity, the antrum, they offer mechanical obstacles to the discharge of the pus. Furthermore, these pre-existing cavities are still further enlarged excentrically by the absorption of lime salts from the bony walls of the pus cavity. The bony septa also disappear in consequence of this process, thereby reducing the proportion of absorbing area of mucous membrane to cell contents.

The excentric enlargement of pre-existing cells may assume such proportions that the whole mastoid portion is turned into a single large cavity, or that perforation of the bone may take place in any or all of three directions, outwards, inwards, and downwards.

In discussing the ages of our 17 cases, it has already been pointed out that the more advanced periods of life are the ones most subject to diseases of the middle ear with burrowing of pus under the mastoid process. Since anatomical experience teaches us that the occurrence of large cells increases with age, we readily understand why the form of disease under discussion is most frequent in the advanced periods of life. Conversely, its rare occurrence in childhood is due to the poor development of the cells at this time of life.

These cells may extend so far back that the sigmoid sinus is surrounded by them, and it may even form the anterior wall of one of these posteriorly situated cells. In a down and inward direction they may extend as far as the jugular bulb.

During the process of chiselling open the mastoid bone or curetting the granulations out of the cells, it not infrequently happens that the soft sinus wall, bared of bone, lies exposed in the wound. In such cases the appearance of the sinus wall may vary considerably, being at times free from deposits and of normal color, while at other times there may be a covering of thick masses of granulation tissue. It must be assumed that in these cases the sinus was bared by the process of lime-salt absorption mentioned above. It is then found to be either bathed in pus or covered with granulations that are continuous with those filling the cell spaces. If this layer of granulation is carefully scraped away with a sharp spoon, dura of a comparatively normal color often is revealed.

Although, when this complication is present, the sinus lies just adjacent to the pus cavity, the symptoms are frequently so mild in character that it is not possible to conclude before the operation that there is present a condition so threatening to the sinus. In other cases, however, we may have indications of a beginning pyæmia.

In those cases in which, before the operation, there were no marked constitutional symptoms, the evacuation of the pus lying against the dura suffices to allow us quietly to await further development, inasmuch as the sinus is freed from its dangerous surroundings. This expectant treatment proved itself justified in a number of our cases, as no further symptoms referable to sinus trouble appeared.

Secondary operations were required in 9 of our cases. Twice it was necessary to ligate the internal jugular vein and to open the sinus, with the result that one patient recovered, whereas the other died of pyæmia. In 4 other cases counter-incisions had to be made. In 1 case repeated counter-incisions had to be followed by extensive opening of an abscess in the soft parts of the neck. Another case developed an extradural abscess which was laid bare, and still another developed behind the operative wound a small superficial abscess that required incision.

The systematic after-treatment of the operative wound consists in changing the dressing at first three times, later twice, a week. As the granulations on the walls of the bony

cavity increase, the tampon that was inserted into the wound is gradually shortened more and more, so that the wound, if it takes a normal course, is generally closed in about four or five weeks. When a counter-incision has been made, it must be kept open by drainage until all infiltration of the surrounding soft parts has disappeared and no more pus is evacuated.

Of the 13 cases that were cured, 11, or about 84 %, recovered normal hearing inasmuch as whispered voice could be heard at from 6 to 9 metres, while before the operation the hearing distance for whispered voice was in all cases less than 60 centimetres.

Summarizing the final results, the following is to be noted: Of the 17 operated cases, 13 were discharged cured, 3 died, and 1 discontinued treatment. The mortality of acute middle-ear suppuration with burrowing of pus in the neck is, therefore, if we disregard the case that stayed away, 18.7 %, whereas the operated cases of mastoiditis that did not present this complication showed a mortality of 8.8 %. If we further exclude from our statistics one case, which ended fatally, independently of the aural condition, on account of myo-degeneration of the heart and pulmonary œdema, there still remains a mortality of 13.3 % for Bezold's mastoiditis against 8.8 % for simple mastoiditis.

REPORT OF THE TRANSACTIONS OF THE NEW YORK OTOLOGICAL SOCIETY, MEETING OF MARCH 22, 1904.

By Dr. ARNOLD KNAPP, Secretary.

DR. EMERSON, PRESIDENT, IN THE CHAIR.

PRESENTATION OF PATIENTS.

Dr. Wilson presented two children who showed **involvement of both eyes and ears, due to hereditary syphilitic disease.** The first was a girl of thirteen; her eyes were affected (interstitial keratitis) and then her ears. The hearing was entirely lost in one week. Pilocarpin injections were administered for three months, without any effect. The child also complained some of vertigo and ataxia.

The second case was a girl of eleven, whose eyes were very severely involved (irido-choroiditis). She was under mixed treatment for nine months, with slow improvement of eyes, when her ears became affected. In ten days hearing in the right ear was totally lost, and in the left it was reduced to the hearing of a loud voice at the ear. After a prolonged treatment with pilocarpin injections, the left improved so that a loud voice could be heard at three feet; the right remained totally deaf. There was some naso-pharyngitis in both. The membranæ tympani were not entirely normal.

Dr. Berens inquired up to what dosage pilocarpin was given.

Dr. Wilson replied, up to $\frac{1}{8}$ gr.

Dr. Hepburn inquired whether there was any bone-conduction.

"There was none in three ears, and in the fourth air-conduction was better than bone-conduction."

Dr. McKernon asked whether the congestion of the drum was always present as it is to-night.

"There has always been some congestion of the drum."

Dr. EMERSON said that he had always found that the middle ear was affected, as well as the internal ear, and that the middle ear in these cases appeared to be congested. He had been able to derive considerable benefit for his patients by inflation and the application of leeches.

Dr. WILSON had ignored the middle ear and asked for advice as to the best course of treatment to pursue, and also whether the middle ear should be treated.

Dr. BERENS was decidedly of the opinion that the middle ear should be treated.

Dr. MCKERNON thought that there would be no result from the middle-ear treatment.

Dr. GRUENING coincided with this.

Dr. WILSON, in conclusion, drew attention to the difference in prognosis between the lesion in the eyes and in the ears.

Dr. WILSON presented an **aluminum forehead mirror,** which appeared to be very light and practical. The joint was a double ball socket, and the mirror could be brought very close to the eye.

VOLUNTARY CONTRIBUTIONS.

Dr. LEWIS reported on a case of acute mastoiditis, where the infection was due to the **meningococcus.** The patient did perfectly well.

Dr. MCKERNON spoke of the two cases of meningococcus infection which he had reported some time ago. In the first, the infection was very rapid after one day; the congestion in the upper and back part of the drum was followed by bulging and a tender mastoid. Paracentesis gave a fluid containing the diplococci. On the same day in the evening an operation was done, and the mastoid was found completely infiltrated.

In the second case, a patient of thirty-three years of age, the process was not so rapid. Paracentesis was done after twenty-four hours, and the operation on the third day, with complete recovery.

Dr. GRUENING said that in regard to the bacteriological examination of ear cases, he had been struck to see how frequently pneumococci were found in the examinations in certain clinics, and he thought that that was very apt to be due to an error, because the cases were really streptococci. He said that at the Mt. Sinai Hospital, where very careful bacteriological examina-

tions were made, out of fifty cases the streptococcus was found in forty-seven, and the pneumococcus in only three.

Dr. ARNOLD KNAPP stated that in the last two years he had examined all of the purulent otitic cases, and had found, especially during this year, the pneumococcus infection very much more frequent than in the ratio which Dr. Gruening had given. The diagnosis was not made by cover-glass examination, but the organisms were cultivated in every case.

Dr. ADAMS reported on a fatal case of **meningitis** after operation. The patient, whom he had seen on the 7th of the month, had been operated upon before and a fistula remained. He performed the radical operation. The case did perfectly well, except for some granulations near the Eustachian tube. On the 15th, skin grafts were applied. Temperature went up on the following day to 103° and remained pyæmic in type for three days, when the patient became comatose. The sinus was uncovered. It appeared perfectly normal, containing fluid blood. The dura over the tegmen was exposed and bulged unusually. It was incised, and the brain was punctured in various directions with a negative result. The patient had had some headache before the operation.

Dr. MCKERNON inquired whether any fluid had escaped on incising the dura.

"No, but there was an unusual amount of cerebral hernia."

Dr. DENCH inquired whether puncture of the lateral ventricle had been performed.

"No." He thought that the case resembled serous meningitis.

Dr. ADAMS spoke of another fatal case of **meningitis.** A child of eight years suffered from a double mastoiditis after an attack of measles. On Wednesday at five o'clock the bulging drums were incised. During the following three days the symptoms of mastoid involvement were apparently clear from the temperature and discharge. Operation was not permitted. Finally, when the operation was performed, both mastoid processes were found completely involved. Death occurred two days later, apparently from meningitis. The affection appeared to be very virulent, and the child was poorly developed.

Dr. DENCH said he had given up the use of the ice coil; he thought it masked symptoms and was a confession of weakness.

Dr. GRUENING had been of this opinion for five years. He cited the case of a girl fourteen years of age with a scanty

discharge, mastoids very tender. Operation after twenty-four hours. Both mastoid processes were infiltrated and there was great destruction. In Dr. Adams's case the pus was in the bone itself. It oozed out, and the bone was mushy—a form which he had always found to be fatal.

Dr. McKernon uses heat rarely.

Dr. Adams asked **what treatment** the members of the Society now favor **after paracentesis.**

Dr. Berens is in favor of hot douches after paracentesis. If this does not relieve symptoms, operation is indicated.

Dr. Gruening, for the tenderness after paracentesis, applies the hot-water bag. He thinks that the ice-bag misleads, and that hot water has all the advantages without any of the disadvantages.

Dr. Adams asked how long the hot applications were applied.

Dr. Gruening remembered a case in which he had applied them for a whole week—in which all the symptoms disappeared.

Dr. Dench thought that in judging of an operation we were guided by the condition of the patient, the condition of the fundus, the amount of discharge, and the tenderness. He considered one of the most important symptoms to be a shortening of the canal. He was distinctly an advocate of early operation.

Dr. Gruening thought that this was dangerous teaching. He had recently seen a case of otitis in a child of two years, after scarlet fever. Paracentesis was performed; the temperature went up; the paracentesis opening was enlarged; the temperature again went up, and persisted for five days. He would not operate, much to the surprise of the attending physician, as he was convinced that there was no mastoid inflammation. The child got well. He did not think the mastoid operation was a simple affair.

Dr. Dench was inclined to believe the favorable termination of this case was due to good fortune, and it would have been much safer to have opened the mastoid when the temperature began to fluctuate. In regard to performing paracentesis the second time in the same patient, he remembered having to do this only twice in his life. If a thorough paracentesis has been done under anæsthesia, and a second one becomes necessary, he regards it as an indication for making drainage posteriorly—in other words, for opening the mastoid.

Dr. Gruening does not agree with this view at all.

Dr. Dench was asked what was the shortest time in which he

would operate after paracentesis. He said from twenty-four to thirty-six hours.

Dr. DUEL asked Dr. Dench whether he considered that the sagging of the canal wall was invariably present.

Dr. DENCH said it was not always present.

Dr. DUEL reported two cases on which he had recently operated, in which the drums and the canal had returned to a normal condition and the mastoids were affected.

Dr. MCKERNON thought that the point of tenderness in young children was very difficult to elicit.

Dr. DENCH stated that we should be guided by the amount of discharge and the height of temperature.

Dr. DUEL had noticed in children that, after cleansing the drum, on pressing down over the antrum pus could often be forced through the perforation.

Dr. HARRIS stated that he thought this was a very important question and he would be extremely grateful for further information—especially what experience the members of the Society had had *in avoiding operations.*

Dr. BACON replied to this question in referring to a paper which he had read two years ago before the Section on Otology, in which he gave a description of 100 consecutive cases from his private practice, of acute purulent otitis with mastoid symptoms, in which 75 recovered without operation and 25 led to operation.

Dr. DENCH drew attention to the statistics which had been gotten up at the Eye and Ear Infirmary, where, in spite of abortive treatments, most cases where the infectious organism was the streptococcus came to operation: in pneumococcus infections 50 % got well without operation; and in staphylococcus, practically all recovered. He thought that the operation for acute mastoiditis was limited to the danger of the anæsthesia; though he was in favor of having a bacteriological examination made, he thought that no one would place the value of this examination over the clinical signs.

Dr. LEWIS thought that some of these cases were made worse by too much syringing, and that in cases of slight or serous discharge he had obtained the best result by using gauze packing, which was inserted at regular intervals by the nurse.

Dr. GRUENING also prefers a drain to syringing, in adults.

Dr. ADAMS inquired of the advantage of suction manipulations.

Dr. GRUENING thought that he had been able to derive a great deal of aid from this procedure, and had often succeeded in removing considerable discharge from the middle ear.

Dr. HEPBURN spoke of a case of **otomycosis,** due to the **aspergillus niger,** which had been cured by three applications of pure carbolic acid, neutralized by alcohol.

Dr. MCKERNON reported on a case of **primary jugular-bulb thrombosis** in a child aged three years; temperature 104.4°, the right drum bulging, the left normal. Right paracentesis; pus evacuated; hot douches applied. On the following day the temperature dropped to 99°, but went up again to 104° in the evening. The child was uneasy; the right ear was discharging. As the left drum was now bulging, it also was incised. On the following day the temperature varied between 105.5° and 98°. He made a diagnosis of jugular-bulb thrombosis, and suggested operation, which was not permitted. The pus gave a culture of streptococcus. On the following day the temperature was 102.8°; the drum was bulging; there was discharge. That evening he operated, and found the mastoid to be only slightly involved; he exposed the sinus and the bulb. In the upper part the sinus appeared dark; but below, distinctively gray and yellowish. The sinus was incised and the bulb was curetted and a clot removed. Free hemorrhage followed. An uneventful recovery took place. The temperature slowly dropped. In another case, the course was favorable for fourteen days, then encephalitis followed with death.

He spoke of the frequency of jugular-bulb thrombosis in children. He thought that, if the temperature were typically pyæmic and if the middle ear were inflamed and discharging, an immediate operation should be performed. In his first case there was no leucocytosis, but streptococci were found in the blood.

Dr. TOEPLITZ reported on a case of **sinus thrombosis,** where the only symptoms were a temperature of 107° and a profuse discharge from the middle ear. The sinus was covered with granulations, and thrombosed. After the removal of the thrombus and the restoration of the blood current, the patient proceeded to an uneventful recovery.

Dr. GRUENING spoke of two cases occurring in the general wards of the Mt. Sinai Hospital, where the diagnosis of lateral-sinus thrombosis had been made by the house staff, as all the other possibilities had been excluded and the drum showed changes of old aural disease. Both patients recovered.

Dr. KENEFICK has been taking care of about twenty children with **purulent otitis after measles,** in the Foundling Hospital. Though the epidemic of measles is supposed to be severe in institutions, not one of these cases presented any complications except erosions of the canal.

Dr. DENCH spoke of the **accidental opening of the jugular bulb during the radical operation.** In endeavoring to expose the hypo-tympanic recess, he inadvertently opened the jugular bulb. The hemorrhage was easily controlled, and did not interfere with the subsequent treatment nor with the skin grafting.

Dr. TOEPLITZ spoke of **exfoliation of the cochlea** in a patient he had recently seen, nineteen years of age, where, after a paracentesis had been made necessary, granulations always reappeared. Two weeks ago he removed a large fragment, which proved to be a piece of the cochlea. On more careful investigation he found that the case was an old one.

Dr. BACON had recently seen a case of **labyrinthine involvement after measles,** occurring at the same time with the middle-ear complication. The discharge had ceased, leaving the patient very deaf. The drums had healed.

Dr. QUINLAN reported the following cases:

CASE 1.—I. O. F. came to my service at St. Vincent's Hospital with several exostoses of the external auditory canal. These were removed after separating the auricle from its attachment. The wound was plugged with iodoform gauze and the auricle stitched back to its attachment. No fever nor severe reaction followed, but after the twelfth day the other ear, which had been the seat of a suppuration twenty years ago, suddenly discharged, which discharge was followed by a severe case of facial erysipelas.

CASE 2.—I saw a patient about fifty years of age a few nights ago in a moribund condition, with the following history. An old suppurative condition of one year's standing. Patient was so well the preceding night that he called at his physician's office and complained only of slight neuralgia over the parietal and temporal regions. During the night he had a well marked chill, followed by nausea, which lasted several hours, from which he lapsed into a condition of unconsciousness, from which, however, he could be roused. P. 140. T. 104° F. The condition was so sudden and so alarming that operative interference was suggested, but the man's appearance forbade such a step. He

never regained consciousness, but died within an hour after I had seen him, presumably of meningitis.

Dr. ARNOLD KNAPP presented a specimen of turbid **cerebrospinal fluid** obtained by lumbar puncture in a patient who had been operated on for chronic purulent otitis and cholesteatoma three weeks ago and presented all the symptoms of meningitis. The turbidity of the fluid was due to leucocytes, but was absolutely sterile. On account of this condition of the fluid an unfavorable prognosis was made and no operation was performed; the patient has gotten well.

Dr. GRUENING said that he did not lay so very much stress upon lumbar puncture. He remembered a case of a boy whom he had operated upon for brain abscess some five years ago. He was taken very ill with convulsions and stupor, with the discharge of a serous fluid from his ear. Lumbar puncture was performed and the fluid evacuated was distinctly turbid, and contained streptococci. The case recovered.

REPORTS OF THE TRANSACTIONS OF THE SECTION ON OTOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

MEETING OF FEBRUARY 11, 1904.

DR. HERMAN KNAPP IN THE CHAIR.

PRESENTATION OF CASES.

Dr. DUEL exhibited a case of **paroxysmal cough relieved by an operation on the ear.** The patient, a boy, was brought to him two years ago with the history of a cough which had lasted for seven years, following an attack of scarlatina, with a perforation and discharge from the left ear. At the time he was brought to the doctor, he had very much enlarged pharyngeal and faucial tonsils, and on examination of the left ear a slight purulent discharge and what appeared to be a mass of impacted cerumen were discovered in the canal. On attempting to syringe the impacted cerumen, or on the slightest touch with the probe, the boy was thrown into a violent paroxysmal cough which amounted almost to spasm. Dr. Duel advised removal of the faucial and pharyngeal tonsils under an anæsthetic, thinking at the time that he would remove the mass from the ear. A week or two later the tonsils and adenoids were removed, and on syringing the ear it was found that the brownish discoloration which had been noticed was due to the cerumen covering a cholesteatomatous mass which filled the canal and middle ear. As much as possible of this was curetted from the canal; it filled the tympanum and the attic. As it had been expected to find only the impacted cerumen and the perforation back of it, nothing further was done. The paroxysmal cough was relieved for two months; the boy became a nose-breather instead of a mouth-breather and improved much in general health. The radical operation for the re-

moval of the mass in the ear was advised, but consent refused. After an absence of a year, the boy was again seen last October, with the history—that about two months after he was last seen the cough began again and had continued, in spite of all efforts to relieve it. The radical operation was again advised and was performed about thirteen weeks ago. The mass was removed. It was found that it involved the attic and the mastoid antrum, and had eroded the roof of the antrum and attic. Ten days later, when the whole curetted surface was covered with healthy granulations, Thiersch skin grafts, lining the cavity, were introduced. At the end of twelve weeks the wound is perfectly dry and the boy is entirely relieved of the paroxysmal cough. The cough was attributed to the cholesteatomatous mass pressing on Arnold's nerve, over its distribution in the canal.

Dr. HARRIS presented a case with a **swelling in the auditory canal,** in which he asked for suggestions as to diagnosis and treatment—an old case of frontal-sinus disease, which from the beginning had been particularly baffling. About eight weeks ago the patient complained of pain in the left ear, due to an acute suppuration in the middle ear. Upon examination, there were bulging and a certain obstruction on the floor of the canal. Paracentesis was performed, the pain relieved, and since then a rather profuse suppuration has been going on ; the swelling on the floor of the bony canal has persisted. It was discovered that there had been a specific disease twenty years ago. The patient was then put on fairly large doses of iodide of potash. In the last three days, a considerable swelling of the upper portion of the canal has been noticed. He has had no pain whatever until to-night, when he has complained of a little; there is very little sensation when the probe is used. The doctor asked: "What is the true character of the lesion in the canal? Is there a periostitis or an exostosis? Is it specific?" There is a positive history from the patient that he has never had any trouble from that ear before.

Dr. WENDELL C. PHILLIPS presented a case of nearly complete **natural dermatization of the middle ear and antrum,** simulating a radical operation. The patient first came to the clinic of the Manhattan Eye and Ear Hospital about three weeks ago, complaining of discharge in the right ear. The left ear was deaf, and on examination no evidence of any discharge was found, but complete destruction of the drum and ossicles, and

the interior of the tympanic cavity was dermatized. The patient had had chronic middle-ear suppuration since childhood, with an indefinite idea as to when the discharge from the left ear stopped; he thought it had been within a few months, but could make no positive statement. During the three weeks that he has been under observation, there has been no evidence of any discharge. The staff at the hospital examined the patient, and thought there was complete dermatization of the entire tympanic cavity. Dr. Phillips said he was inclined to think that if the case were watched some dropping from the attic region would be found. There is no particular evidence of a cholesteatomatous mass at the present time. The patient does not complain of the affected ear, beyond the deafness.

Dr. BERENS presented a case of **ligation and excision of the jugular vein for lateral sinus and jugular phlebitis.** The patient's history dates from childhood, when she had scarlet fever with a constant discharge from the right ear. A few days before he saw her, another aurist removed a large mass of granulation tissue from the right side. The patient was suffering from acute exacerbation of discharge when Dr. Berens first saw her, together with a well-marked mastoiditis. At that time the radical operation was performed. There was an area of necrosis of the bone over the lateral sinus below its knee. Removal of this bone disclosed a large area of granulation tissue on the lateral sinus wall. The sinus was exposed above and below, and apparently was not diseased. It was not disturbed. The next morning she was taken with a chill and high temperature—104.8° F.; great pain and tenderness limited to the line of the jugular vein. The wound was re-opened, the sinus again laid bare, and the patch of granulation tissue exposed. The sinus did not look healthy for a small area around the granulation tissue; posteriorly the sinus was healthy, but below it was streaked. The jugular vein was exposed, and found to be in a mottled condition; the walls of the vein were extremely congested; also, the vein contained fluid blood; but the mottling and congestion were so marked, that it was decided to ligate and excise. Microscopical examination failed to reveal any infection of the wall, but there were small hemorrhages in the walls of the vein. The lateral sinus was opened, and contained a parietal clot beneath the granulation tissue. The patient did well for two or three days, when she was taken with a sudden attack of diplopia—

which, however, did not persist more than a few hours, and was attributed to other causes than that of the vein. She went on for a day or two longer, the wound in the neck was stitched, and four days later the dressing was changed; the wound in the mastoid was found perfectly clean, except for the two small sloughings at the point of the previous infection, at the site of the granulation tissue and clot. The wound in the neck was found boggy; it was opened, and found to contain a large amount of pus. This cleared up rapidly, but was followed by pus in the bulb; and in a day or two after there was a sloughing of the walls of the sinus. This slough was removed farther up and the sinus was repacked. In two weeks she developed á pleuro-pneumonia. She finally recovered. The original operation was done on November 16th; the ligation on the 17th. The examination of the eye grounds revealed the right nerve swollen; the left eye contained hemorrhages. The neuritis has disappeared, she has no disturbances in the right eye, and the hemorrhages are rapidly disappearing from the left eye.

Dr. LEDERMAN exhibited a case of gun-shot injury of three years' duration with **bullet imbedded** in situ **in ear.** Three years ago the woman had been shot at very close range by a .32-calibre revolver. The bullet entered above the tragus on the left side. She said she did not hear anything with the left ear since that time. After the injury she was unconscious for three weeks; and states she did not appreciate her surroundings for two months after that. On examination, a small scar above the tragus was discovered, bluish in color, which appeared as if there might have been an injury there some time in the past. There was a purulent discharge, and the canal of the ear was almost completely occluded by a fibrinous mass which was attached about ¾ inch back on the anterior surface. She felt as if something was in the ear. The bullet had not been removed. She had a facial paralysis following the injury, and was very unsteady on her feet for some time afterwards. The fibrinous mass was removed: it was about ¾ inch in length and about ½ inch in thickness. After this was removed there was a free flow of blood. The wound was packed for a few moments. On removing the packing and examining the injured ear, a darkish mass was observed, and on employing the probe, this substance proved to be the bullet. It is wedged tightly in the internal wall of the middle ear, surrounded by granulation tissue, with the anterior

portion of the *Mt* in position. The only remaining question in her case is to get it out. Dr. Lederman said he would try through the canal first, and if this did not succeed, would resort to the radical operation.

Discussion.—Dr. PHILLIPS thought that the natural supposition in the case presented by Dr. Harris was, that there was some specific development, although he was aware that a gumma in that location would be unusual. A gumma should have, by this time, begun to subside under the treatment received from Dr. Harris. It was odd that the patient should have had a cellulitis extending over such a long period. The boggy appearance would suggest a collection of fluid; conditions not dissimilar are seen in the pharynx and throat.

Dr. WHITING said that several possibilities suggested themselves in connection with this case of Dr. Harris's: the fact that the man has in the other ear (the ear of which he does not complain) a well-defined exostosis of the meatus, almost symmetrical in the arrangement of the canal, with one exception: in the anterior superior quadrant there is a slightly bulging exostosis, so narrow as to be almost spicular in form; it practically covers up the anterior half of Shrapnell's membrane; the fact of the presence of an exostosis of that character, and the fact that the man had been for years a sea bather, together with the knowledge that he has had a specific condition, would lead one to infer that the mass which appeared on the infected side was probably a beginning periostitis, and that there was a productive ostitis beneath it. There is a question whether that may not have become infected from the purulent discharge which has been going on for two years. The condition might be accounted for and kept up as long as there is an irritating discharge. It seemed to Dr. Whiting that this was an important element. He had had no experience with gummata in that location, but it seemed possible to him that it was a periosteal involvement with a productive ostitis beneath it.

As to Dr. Phillips's case, he coincided with the opinion expressed by Dr. Phillips, that there was a cholesteatoma in the antrum. It was very evident, he said, that the inflammatory membrane there, the newly generated membrane, does not line the antrum, because it lies on a plane decidedly anterior to the promontory; he believed that it is held away from the floor of the antrum by an accumulation of cholesteatomatous material.

Dr. PHILLIPS inquired whether in Dr. Berens's case any clot was found in the sinus.

Dr. BERENS replied that there was none.

Dr. WHITING said he had understood Dr. Berens to say that the examination of the vein made showed no infection whatever; he wished to inquire if the sheath was examined when the vein was removed from the neck.

Dr. BERENS replied that the whole thing was examined, and no lymphatic infection found.

Dr. WHITING said that it seemed to him that if there were no lymphatic infection the wound, having been sewed up by primary operation, ought to have been healed. In cases where he himself sewed it up, the sheath of the vein was infected—as it was found on examination. He had found certain enlarged lymph nodes, all of which were infected. He thought possibly the sheath of the vein had not been examined in Dr. Berens's case, otherwise, he did not see how the infection in the neck occurred. In his experience, in every case where he had resected the vein and sewed it up, he had had infection and had had to open it. In his cases there was infection in the sheath, although in the wall there was no infection.

Dr. HARRIS remarked on the excellent result attained by Dr. Berens in this case. He had seen the case, and had followed the doctor in the dressings once or twice, and had believed that the patient never would get well. To-day she is the picture of health. He thought that Dr. Berens should have dwelt a little more on the neurological side of the case; he wished he would refer to what the neurologists have said to account for the various ocular symptoms—whether caused directly or indirectly from the infection in the neck.

Dr. GUTTMAN said that he was not quite clear about the diagnosis of the case, and its treatment. He understood that the diagnosis was made principally by the pyæmic fever and by symptoms of the eye; diplopia was mentioned, but no cause was assigned to it; the kind of diplopia was not stated, or whether it positively had anything to do with this lateral-sinus thrombosis. What was the pain along the jugular vein produced by? As he understood it, practically no severe infection of the jugular vein was found. He wished to know exactly what the indication for the ligation was.

Dr. LEDERMAN recalled the fact that some years ago he pre-

sented before the Section a young girl with jugular thrombosis, in which he had opened and curetted the sinus and had resected the vein. He left the neck wound open. The patient did very well for a week or ten days after the operation, when the temperature ran to 105° F, with swelling in the neck posteriorly to the neck wound. The case was watched for twenty-four hours, when the swelling appeared to extend farther backwards. It was then decided to operate. Incision was made over the point of the greatest tumefaction, but all that was found was a phlebitis, with the veins enormously dilated. After wet dressing for a few days, the patient made a recovery. Enormous quantities of fluid came away on the dressing, but no pus.

Dr. DUEL stated that in ten cases where he had had occasion to ligate the jugular vein, he had found that the glands along the course of the vein had been involved. He did not remember any case, among several others which he had seen operated by other surgeons, in which this fact did not hold true.

Dr. BERENS said that the lack of infection microscopically was a great surprise to him. A portion of the sheath of the vein was sent with the vein to the laboratory, and the whole specimen was examined and re-examined. After repeated examinations, the only report was that the intima was markedly swollen, with minute hemorrhages into the middle walls of the vein. The reason he ligated the vein was on account of the very unusual appearance which it presented; he had seen but one like it before. The vein was mottled, bulging; it appeared purple, with whitish blotches upon it, and dilated nutrient vessels of the vein passed through the blotches. There was evidently a phlebitis, but what kind of phlebitis was not known. The glands were not removed; a great deal of care was taken not to infect the wound in the neck; but in spite of this precaution there was a development of pus in two or three days. As regards the nervous phenomena, there was a crossing of the right eye to the left; but this was of very short duration, and at the time of its development there were a number of other nervous phenomena—extreme vertigo and dimmed vision, photophobia—altogether a very beautiful hysterical picture. This disappeared in a very few hours; it was followed by severe pain in the shoulder and in the side, which disappeared and had no connection apparently with the subsequent pleuro-pneumonia which she developed. There was distinct disease of the lateral sinus. There was no clot, but the fact

that there was disease of the sinus at the point of granulation tissue, sloughing so shortly, instead of healing as it should, proved that there was an infection at that point. He would not have gone into the sinus or into the vein, had not the tenderness in the neck been so great and the area on the sinus appeared to be diseased.

Dr. GUTTMAN read a report of **a fatal case of chronic suppurative otitis with cholesteatoma in the drum cavity and antrum, cellulitis of almost the entire scalp, thrombosis of the middle portion of the transverse sinus, cerebral abscess, and softening of the cerebellum,** which is printed in full on page 176.

Discussion. — Dr. WHITING, in commenting on the very interesting paper read by Dr. Guttman, thought that all who had had even a moderate experience with sinus thrombosis—whether the result of chronic suppuration or of acute suppuration—had a very pronounced respect for the thrombosis which has proceeded sufficiently far to cause well-defined and easily recognizable Griesinger symptom. The case which had been recounted was distinctly a cholesteatoma—whether the cholesteatomatous nature of the infection could be relied upon to produce a more virulent infection of the veins and lymphatics, was to him a question. In the seventeen cases on which he had operated, cholesteatoma was not found in a single instance. In those cases where the process was due to chronic suppuration, cholesteatoma was absent; nor was there in any of the cases cholesteatomatous material or epithelium which had undergone a metaplastic change and could be distinctly called a cholesteatoma. The chronic cases were without cholesteatoma, and the acute cases were those in which the infection in the majority of instances was streptococci—not pure, but streptococci and pneumococci mixed. He had never seen a case where the septic phlebitis had extended to the extent described by Dr. Guttman — involving all the veins in the occipital region, extending over the parietal region as far as the vertex. Whether or not the swelling which occurred in the eyelids was characteristic of the so-called Stirling symptom, was questionable — the swelling of the external or temporal half of the upper and lower lids and brow; the appearance of œdema in that situation is often called the Stirling symptom. That has been found, as a rule, where the clot has extended forward through the circular sinus into

the cavernous sinus. In this tremendous amount of cellulitis of the scalp, it seemed reasonable to suppose that the amount of swelling of the lid was largely due to the extension of the cellulitis. He questioned the wisdom of delaying the uncovering of the sinus instead of proceeding at the time of the first operation. There were evidently conditions present which were not accounted for in the mastoid process; he thought the doctor must have been satisfied, when he had thoroughly removed the cellular structure from the mastoid apophysis, that he not reached the cause of the trouble; simply a subperiosteal abscess and a destruction of the cellular structure of the bone would not account altogether for the symptoms the patient had exhibited up to the time of operation. It seemed to him that the doctor would have been justified in going on farther and investigating the interior of the skull. He found an opening in the roof of the antrum, and the dura was exposed, covered with granulation tissue; also, the dura pulsated. It seemed to him that the uncovering of that dura, with the presence of granulation tissue, would have warranted the doctor in pursuing farther. If he had done more, he would have found, as he did at the second operation, that he had a suppurating phlebitis; the parietal wall was disintegrated to a certain extent; he would have known that he had a sinus thrombosis to deal with, and his subsequent conduct of the case would have been more favorable for the preservation of the patient's life. Dr. Whiting had frequently found when operating for sinus thrombosis on patients who were in a critical condition, that intravenous saline infusions were of decided benefit, that with their help he had gone on and completed procedures which he was certain a few years ago he would have hesitated to undertake; the effect was marvellous. Continuing, he considered that having evacuated the subperiosteal accumulation of pus, having opened the mastoid and cleared out the cellular tissue, having found that there was a distinct mass of cholesteatoma, and that the bits of granulations were protruding, Dr. Guttman should have gone farther. He believed that if this had been done the prognosis for the patient would have been better than it was when the second operation was undertaken.

Dr. H. KNAPP, in discussing Dr. Guttman's report, said:

The objection Dr. Whiting makes to the management of Dr. Guttman's case is, in my opinion, well taken, but mitigated by the circumstances in which Dr. Guttman took charge of this

remarkable and desperate case. He saw the patient only a few hours before he had him brought to the hospital. After a short rest, the patient was operated on. When the ear and mastoid had been cleaned out, the patient was so feeble that it seemed advisable to let him have a night's rest. The same reason may also, in a measure, apply to the interruption of the surgical interference after the other operations.

In discussing this extremely severe case, I shall confine my remarks to two or three points: From the second day I was inclined to believe that a cerebral abscess was the starting-point of all the extra- and intra-cranial symptoms.

At the *incision of the fluctuating elevations of the scalp*, a thin, very offensive, purulent liquid gushed out. The outer surface of the bone was shining white, showing erosions and perforations. This, evidently first subdural, abscess pierced the dura, corroded and perforated the skull-cap in different places, causing the cellulitis calvariæ. The lateral sinus was laid bare almost in its entire extent. It was filled with a septic thrombus of about 1½ inches in length toward the torcular, and the sigmoid portion contained fluid—normal-looking blood.

In two patients I have seen extracranial pus collections in that place—*i. e.*, midway between the torcular and the upper knee of the sigmoid sinus. In both patients the fluctuating swelling of the scalp was incised, yielding pus, and on sounding it the probe passed through a ragged perforation of the bone in the cranial cavity, liberating more pus, being arrested by a soft and membranous resistance—dura mater. I drained the cranial fistula in both cases with a perforated silver tube. The first patient died. The autopsy showed epicranial and subcranial collections of pus, cerebral abscess, and thrombosis. The case is published.[1]

The other case was a strong-built negro, who had chronic suppurative otitis media. In the parietal region a fluctuating scalp swelling had formed. It was opened, pus was found, a probe penetrated through a small opening of the skull into the cranial cavity. A perforated silver tube was introduced, draining the intracranial suppuration (epidural, subdural, or cerebral abscess). The patient was in the hospital several weeks; he improved, lost fever; discharge a minimum. The patient left clandestinely, but reappeared two years later, having had no more trouble from ear and head.

[1] H. Knapp, "Three Serious Cases of Mastoid Disease; with Remarks," ARCHIVES OF OTOLOGY, xii., p. 44, etc., Case 1, 1883.

I remember having read of cases of extracranial abscesses from epidural suppuration, in just the same place where the collections were found in my patients. This suggested to me the idea that this region, the middle of the transverse portion of the lateral sinus, behaved as a place of predilection for spontaneous perforations of the skull. Seeking an anatomical or pathological cause, I cannot account for this fact—if fact it be—in any other way than the preponderating frequency of otogenous abscess in the temporo-sphenoidal lobe.

Dr. LINN EMERSON cited a case on which he had operated a short time ago, in which the mastoid was involved. The case was almost in extremis at the time of operation; the sinus was found thrombosed, and the condition was so bad that any further procedure did not seem justifiable. Acting, however, on the advice of two much older physicians, who thought the operation should be completed, he ligated the vein. The patient never came out from the anæsthetic.

Dr. LEDERMAN, in speaking of the symptomatology, said that he had seen cases which were operated upon for mastoid complications, in which the symptoms did not improve after the operation, and indications pointed to cerebellar infection. In three fatal cases, which had come under his observation, he had been able to secure autopsies. In each of these cases, although the clinical aspect pointed to a temporo-sphenoidal abscess and there was disease of the attic, the autopsy showed lepto-meningitis. In another instance, the slow pulse and occasional rise in temperature, with pyæmic symptoms, went along for ten days after the mastoid operation was performed. The operator stated he had found disease of the attic at the mastoid operation. With this history, Dr. Lederman agreed with the diagnosis of the neurologist, as to the case being one of temporo-sphenoidal abscess. The brain was opened in this region and a knife plunged in four or five times, but no pus was found. The incisions were separated sufficiently to find it if there were an abscess in that locality. After this operation the patient felt decidedly improved. He got out of bed, and said he was ready to go home, when suddenly he became unconscious, and remained so for about four or five days. The neurologist then diagnosed cerebellar abscess. The doctor proceeded to remove the posterior portion of the bony structure, but by the time he reached the cerebellar region the patient was in extremis. The knife was

quickly plunged into the right hemisphere, and a large quantity of foul-smelling pus was found; but the patient did not recover. Dr. Lederman said that if he had a similar clinical experience he would not attempt to remove the bone posterior to the mastoid operation, but would immediately go for the cerebellar lobe; he thought valuable time was lost in attempting to chisel away when the patient was unconscious and where symptoms point to cerebral involvement. As regards the eye-grounds, he remembered an acute case where the mastoid was opened; there was acute suppuration. The symptoms improved very materially, except that at about the third week the patient developed a chill and a temperature. The eye-grounds were examined and nothing found. Although there was no part of the skull which was very tender—except one spot that the patient said was sore, posterior to the mastoid surface,—the patient was kept under observation. The blood was examined, malaria being suspected. The patient looked yellowish—septic in character. Plasmodia were found in the blood. Quinine was given him and the temperature lowered somewhat. The man was running a temperature of 103°–104° and had two chills. On again opening the mastoid a drop of pus in the antrum was found—which was not sufficient, however, to account for the temperature and chills. An epidural abscess was finally discovered. The patient recovered. In another case, operated on for mastoiditis, the patient developed a very high temperature, 106°, with tenderness along the jugular. It was a question whether there was not a sinus thrombosis of the jugular to deal with. It proved to be an erysipelas. Under local application of ichthyol the patient recovered.

Dr. WHITING, in answering Dr. Knapp's statement that he was convinced that nothing would have made any difference in the result of Dr. Guttman's case, that it was necessarily a fatal one, said that although this was doubtless true, it was not the question—it was a question of principle. He cited a case of sinus thrombosis in which he resected the jugular and evacuated 4½ oz. of pus from the temporo-sphenoidal lobe. The patient's heart could scarcely be heard with the stethoscope, but two quarts of saline solution were introduced into his veins, and he made an absolute and perfect recovery. Another point that was not brought out in the discussion, was the question as to which was the primary infection. It is well known that when there is an infection of this nature, where the antrum is filled with

pus, where there is an immense number of nutrient veins and an equally large number of lymphatics running in all directions from there, any number of lymphatics may have been infected at the same time, and the lymphatics may have carried an infection directly up into the temporal lobe. It seemed to him that with an infection of the character described it was likely that the abscess of the temporo-sphenoidal lobe was coincident with involvement of the sinus, and that the softening of the cerebellum was due to the infiltration of the infection through the visceral wall.

Dr. GUTTMAN admitted the advisability of a quick procedure, as suggested by Dr. Whiting, but said the case was not sufficiently clear when the operation was performed. The cellulitis was quite a complicated factor in the diagnosis. It was a question as to whether it was independent or in connection with the infection of the temporal bone. On the other hand, it might have been a subdural abscess. This was one of the reasons which made the delay of twenty-four hours seem best.

MEETING OF MARCH 10, 1904. DR. HERMAN KNAPP IN THE CHAIR.

PRESENTATION OF CASES.

Dr. TOEPLITZ exhibited a case which he had operated upon for **sinus thrombosis** after acute otitis. The patient was first seen four weeks ago; there was a temperature of 107°, pulse 120, profuse discharge from the right ear. The patient's face was flushed, but he was conscious and did not feel extremely ill. The mastoid was not very sensitive on pressure, except over the antrum. The temperature had been high for about eight days, and two weeks before he first saw the patient he had the beginning of an acute otitis media with profuse running. A week later, he had a chill during the night, which lasted for about five minutes; he then had two more chills. He decided to operate at once, as he was convinced that there was a thrombosis of the lateral sinus. There had been temperature varying between 103°, 102°, and 107°. The antrum was entered and nothing but blood was found; the lateral sinus was exposed without difficulty, and was found to be covered with dirty-looking granulations. It did not pulsate. As the needle brought nothing, the knife was used to split it, and a thrombus was extracted; the sharp spoon used in a horizontal and downward direction was followed by free

hemorrhage. The sinus was plugged. The next day the temperature was 104°, the following day 103°, and on the third day 101°; on the fourth day the temperature was normal, and has remained so ever since. The suppuration of the middle ear ceased after the operation. The patient remained in bed for ten days, and was then discharged from the hospital.

Discussion.—Dr. MYLES remarked that the case presented by Dr. Toeplitz seemed rather against the rule, but that the ear frequently surprised us when we chiselled into it under suspicious circumstances. He cited a similar case that he had seen last summer—a man forty years of age, who, in accordance with a physician's orders, had been exercising with dumb-bells. The ear was discharging from the posterior superior quadrant, and there was a suspicious tenderness and softness about the mastoid. The cortex was removed; large granulations were found growing from the lateral sinus, which, for its entire course, was bare. The sinus was opened; normal blood flowed out. The adhesions to the sinus walls around the margins of the opening in the bone were not disturbed. The patient made an uninterrupted recovery.

Dr. DENCH believed that the time to take these cases in hand was at their very beginning; that it was decidedly advisable to expose the lateral sinus in any suspicious case where there was a high temperature. He thought that in a case like that of Dr. Toeplitz's, where the temperature ranged from 107°, 106°, 104°, with discharge from the ear, with practically no tenderness over the mastoid, there was sufficient evidence for going into the mastoid at once, and not stopping there. He thought that where there was a high temperature in a case of this nature, the very fact that absolutely nothing was found in the mastoid should make one go a step farther and enter the sinus. He had seen a case where mastoid tenderness had existed but where it had been impossible to operate on account of pneumonia. The discharge from the ear had practically ceased, and yet when the bulb was exposed it was found full of pus. This shows that the cortex may be comparatively healthy, but that in a certain number of cases the disease will travel inward towards the cranial cavity. He urged that when there was any doubt as to the advisability of opening the sinus it should be opened. He had yet to meet with a single case of infection at the time of operation if the operation was conducted with proper aseptic precautions.

On the other hand, he had seen cases go wrong because, on exposing the sinus, it had seemed fairly normal and had been allowed to go unopened, with the result that, in a few days, there was a purulent clot. He again emphasized the fact that in every doubtful case the sinus should be opened, free hemorrhage established from above and below, and the sinus then plugged.

Dr. LEDERMAN told of a case which he has under observation at present—a young girl with acute suppurative otitis media, with mastoiditis. Both the patient and her sister had been operated upon by his assistant for the same disease. The one operated first progressed very favorably, but the second developed a temperature on the third day after the operation. Quite some disease was found in the cells, but no injury of the sinus occurred at the time of operation. In the first case, the sinus was injured, but no unpleasant results followed. The second case, in which the sinus was not wounded, and in which no disease of the sinus showed at the time of operation, has been running a very peculiar course, with an irregular temperature up to 105°–106° F. Dr. Lederman at first believed the symptoms to be due to a lateral-sinus or jugular thrombosis. A week after the mastoid operation, the wound was thoroughly cleaned and the sinus was opened to the extent of ¾ inch with the knife. This exploration was carried out, with the patient in bed, without an anæsthetic, as the sinus had been exposed for about an inch at the mastoid operation. There was no evidence of pus.

The temperature went down, then up again to 104°, and then down. It varied so much that it was thought there was, possibly, infection somewhere else. The case then assumed the appearance of typhoid: tremulous tongue, tenderness in the right iliac region, foul-smelling stools, tympanitis, with the temperature still going up and down. The patient had received four injections of anti-streptococcic serum, without any influence on the temperature or unpleasant results. The temperature is still high, although not quite so high as it was (103°).

Dr. Lederman thought that the jugular bulb was affected. He did not feel warranted in operating farther, however, as there are no headache, no changes in the eye-grounds, etc. There was but once a chilly sensation. The wound looks clean. The doctor did not think any other operation justifiable while the patient was improving. He believes that where there has been an inflammation of three weeks' standing, provided a thrombosis

exists, there would be other manifestations of a septic nature. There is no leucocytosis to speak about; the bacteriological examination shows some few streptococci and micrococci. No plasmodia were found in the blood, and a Widal test was negative.

Since the above remarks, the patient is gradually improving, without further surgical intervention; she has had intestinal antiseptics by the mouth, and rectal douching. The clinical aspect resembles a typhoid complication.

In speaking of the advisability of early operation in these cases, he recalled a case which had impressed him very forcibly. The patient had an acute inflammation of the middle ear and slight mastoid symptoms. The drum was incised, and the symptoms cleared up, but a week later the temperature rose and there was a slight chill. Plasmodia were found present. Injections of quinine were given, which brought the temperature down, but the patient complained of pain on the posterior surface of the mastoid. The eye-grounds were examined repeatedly, and when evidence of disturbed venous circulation appeared, we decided to open the mastoid. The superficial bony tissues appeared healthy, but there was a drop of pus in the antrum. The wound was about to be closed, when an epidural abscess was discovered, posterior to the antrum, containing from one-half to one teaspoonful of pus. The case had been going on for four or five weeks before indications for the opening of the mastoid presented themselves.

Dr. DELAVAN reported **an accident** which had occurred a few days ago with the **Chevalier-Jackson transilluminator lamp.** The instrument used had been recently obtained from a leading instrument-maker, and had been found to work satisfactorily. Desiring to demonstrate the maxillary sinuses of a patient, the doctor was about to introduce the lamp into the gentleman's mouth, when, without any particular reason, he tested the lamp once more. Instead of holding it in front of the patient's face, as one might be tempted to do, he turned it away and established the current, when the lamp exploded with a loud report. The explosion was heard in various parts of the house at considerable distance from the doctor's office. The lamp was shattered, and an intense burning took place at the socket of the lamp, which destroyed everything in its way—even the copper cap in which the lamp was secured being badly burned. The speaker thought it necessary to record the fact that the instrument under any cir-

cumstances could act as this one did. Undoubtedly, from the loudness of the report and the way the glass was shattered, the explosion was a violent one. The results would have been extremely disastrous if the lamp had exploded in the patient's mouth, both from the force of the explosion and the injury from the shattered glass, while the heat would have inflicted a severe burn. One of the objections to this instrument is the very considerable size of the lamp (8 candle-power). The street current is used, said to be modified by a little apparatus attached to the instrument. The latter is evidently insufficient to insure safety and the apparatus is unquestionably dangerous.

Dr. DENCH had had the same kind of lamp blow out twice, but never with any serious accident. In his own experience the fuse had always blown out in the plug, simply putting out a certain number of lights in the house. In each case it had short-circuited in the handle. He had happened to have weak safety fuses in the house, and it only blew them out, without bursting the lamp.

Dr. MYLES did not see the necessity of using lamps of such brilliancy; he thought a four-candle-power lamp was sufficient for any examination, that it would give all the light needed for any transillumination about the head; excessive illumination destroyed much of the delicacy of the tests.

Dr. LINN EMERSON asked if the plug had been taken apart to see if the fuses had been properly put in. [It had not.] He had found that many of the plugs had fuses that were too heavy; if short-circuited the fuses will go out; they should be light in weight. He had also found the "repair man" guilty of putting in copper wire. If properly fused he did not think the short circuit would burn out the lamp.

Dr. EMERSON related a case of **foreign body in the auditory canal** of a patient now fifteen years old, who, six years ago, when a child nine years of age, while playing on the beach at Asbury Park had put a pebble in her ear, hurriedly notifying her aunt of the fact, who rather laughed at the child and decided that it was imagination on her part. At frequent intervals since, the patient insisted that the pebble was in her ear. About two weeks ago, she developed pain and deafness; the deafness was absolute for a watch—she could not hear it except on contact. On examination, the pebble (which Dr. Emerson exhibited to the Section) was found. It was discovered by a member of the family

who put a hair-pin in the ear. It was tight against the drum and had injured the canal. After two or three manipulations with different-shaped foreign body hooks, without accomplishing anything, the doctor was about to give it up, when he thought of using sealing wax on a cotton-tipped probe. After four attempts he succeeded in withdrawing the stone. Immediately afterwards the child could hear a watch at a distance of 36″, and four days later was entirely well. Dr. Emerson said that he did not know what the experience of others had been, but his was that it was not so easy as he had supposed it to be.

The lamp must be held close to the ear of the child, or the wax would get cold before he could get it in contact with the foreign body. The hot wax in the canal was also very painful to the patient.

Dr. LEDERMAN cited an experience he had had with a pebble not long ago. Two or three attempts had been made to remove the stone before the case presented itself to him. When he saw the patient there was a mass of granulation tissue around the foreign body; the foreign body could be felt with a probe, but it could not be seen. The pebble had been lying there probably two months, and had imbedded itself in the posterior wall, and had been forced through the drum. When the auricle was pushed forward, after being freed from its posterior attachment by the usual mastoid incision, close to the fold, he was enabled, by putting in a curette, to gradually work out the pebble. The suppuration cleared up and there was a complete recovery. It was a case of too much manipulation; if the tissues of the canal are wounded, swelling, infection, and granulations are apt to form, and such an operation has to be performed to remove the foreign body.

Dr. EMERSON remarked that the reason he did not make any further attempt to remove the pebble with the foreign-body hook was because when he advised giving the patient an anæsthetic, so that he might remove the pebble, consent to do so was refused by the child's mother.

Dr. HOLMES reported a case where a family physician had attempted to remove a green glass bead a little larger than the pebble which had been shown, and in his efforts to get it with a pair of forceps, the physician had pursued the bead until it had ruptured the memb. tymp. and had been forced into the middle ear. It was necessary to give the child an anæsthetic. The

attempted removal being only a few hours before the patient was seen, there was but little swelling of the canal, and under anæsthesia Dr. Holmes readily removed the bead from the middle ear, where it had lodged.

In speaking of an examination he had made at the Jacksonville (Ill.) Institution for Deaf-Mutes, Dr. Holmes stated that among the children was a girl who was not absolutely deaf, but whose hearing was not sufficiently good to admit of her attending public school. The hearing in one ear had been totally lost during infancy. Upon examining this child, the doctor found the external canal of the hearing ear very firmly closed by a locust bean. The girl was fourteen or fifteen years of age, and the history given was that the bean had been in there for five or six years. The patient had always maintained that there was something in the ear, but had not been believed. Dr. Holmes succeeded in splitting the bean with a sharp knife, and then extracted the pieces. Notwithstanding the length of time it had been imbedded there, the drum had not been affected, and the canal was practically not inflamed. Hearing was considerably improved after removal of the foreign body—pathological changes the result of former inflammation precluding the possibility of complete restoration.

Dr. DENCH was reminded of a case at the Infirmary years ago, in which there was a watermelon seed in the ear. It was deep in the canal, well against the drum-membrane. Under anæsthesia the doctor mined out the entire interior of the seed, and by means of the curette was able to pull the thin shell out.

Dr. HARRIS read a report of **a case of combined acute otitis media and otitis externa, with some unusual symptoms.**

Mrs. S., a Jewess, aged fifty-three, was seen by me on February 7th, on account of pain in the left ear, which had then existed one week without treatment. Examination of the ear at that visit showed a moderate degree of bulging of the membrana tympani. There was no swelling or tenderness on pressure over the auricle or in the auditory canal, but over an area corresponding to the left temporo-sphenoidal lobe severe pain was complained of, especially at one point—also at the condyle articulation in front of the ear. The pain in the ear had ceased at the time of my visit. There was no pain in the teeth or jaw, though the condition of the teeth was bad. Temperature normal. Pulse slightly accelerated. Patient did not suggest a hysterical subject.

She had never had trouble from her ear, but had recently recovered from an attack of sickness described as rheumatism. I learned that there had been a slight discharge from the ear three days previous. A paracentesis of the drum membrane was performed by me and hot douching to ear ordered. As an ice-bag had been used previous to my visit, I ordered it discontinued, and substituted hot poultices in front of the ear. There were no mastoid symptoms. Examination of discharge from ear after paracentesis showed no streptococci, but the diplococcus intercellularis. This visit was on Sunday. The next day she was slightly better, some pain in the ear and head. Tuesday the pain was intense in both ear and head. Discharge from ear scant; no bulging of the drum. The pain outside of ear was limited to one point in front of ear and one above and anterior, both acutely sensitive to touch. I could not believe that the condition was deep-seated, but was reminded forcibly of a case I reported to this Section two years ago, where the symptoms were not dissimilar: This was a young man in good health, with no previous ear trouble, whom I saw on the second day of his illness. He complained of excessive pain in the ear. The membrana tympani was only slightly bulging. A paracentesis was promptly performed. Temperature and pulse and mind normal. Nothing relieved the pain. A mastoid operation was performed on the fourth day, without revealing pus or diseased bone; later, the cranial cavity was explored. He died the eighth day of a leptomeningitis. For several days his temperature remained perfectly normal. Feeling that there was possibly some constitutional factor, I ordered, in the present case, full doses of salicylic acid, later adding iodide of potash, and locally applying blisters over the sensitive area. This had no appreciable effect—only morphine gave any relief. There was now a slight elevation of temperature. From Tuesday to Saturday the condition did not change. On Saturday, the sixth day, I discovered for the first time a swelling of the cartilaginous portion of the auditory canal, completely hiding all view of the drum membrane. The case was seen on the afternoon of this day, in consultation, by Dr. Wendell C. Phillips.

By this time, eight hours later than my morning visit, the swelling of the canal had disappeared. Tenderness on deep pressure over the antrum was elicited. An ice coil was applied to the mastoid, and internally Warburg's tincture was ordered.

Examination of blood and eye fundus negative. The following morning the deep swelling of the canal had recurred, with increase of the pain in the head. An incision down to the bone was accordingly made in the anterior wall. The relief to the pain was marked and immediate. Tenderness over mastoid antrum seemed, however, increased. The day following, this also was better; forty-eight hours after the incision into the canal, the pain and swelling recurred, and a second incision was made with equally beneficial result. At this time, or a week after the first visit, she first complained of pain in the roots of the decayed teeth of the lower jaw. This has persisted at intervals since then. When it becomes particularly severe, pain will be experienced in the head, or even in the ear; all tenderness, however, over the parietal bone has long since disappeared. The discharge, too, from the middle ear has virtually ceased, and the patient is convalescent.

The association of pain in the teeth, in the auditory canal, and in the scalp and head clearly shows an involvement by pressure of the several branches of the trigeminal. As you will recall, the inferior maxillary branch sends a large trunk, the inferior dental, to the lower jaw, and a temporo-auricular branch to supply the outer ear and the auditory canal. This afterwards proceeds near the temporal artery up in front of the ear, to lose itself on the side of the head. A neuralgic condition of these terminal branches would seem to account for the areas of excessive sensitiveness in this region. While this is evident now, the absence of all dental pain and all swelling and tenderness in the canal during the early days of the illness served to greatly obscure the diagnosis and to suggest the possibility of some deeper-seated meningeal trouble—the result of the middle-ear suppuration, as in the other case just referred to.

Discussion.—Dr. LEDERMAN reported a case which he saw last week, which demonstrated how difficult it is with these cases of external otitis, especially those associated with infectious diseases, to make a diagnosis.

The case was that of a woman of seventy years, whose family physician had been treating her for an existing acute bronchitis. She complained of pain back of the right ear, but it was exceedingly difficult to get any inspection of the drum; the calibre of the canal was so encroached upon by a bulging of the posterior meatal wall that the drum could scarcely be seen. The anterior

quadrant looked pale, the posterior portion seemed a little pinkish, but not bulging. The mastoid was œdematous and pitted deeply, and there was distinct pain over the tip and emissary vein. It was a question as to whether the case was not one of a quiescent chronic suppuration with mastoiditis. There was sour, rather foul-smelling secretion removed on the cotton-wrapped applicator. There was no history of previous suppurative ear disease. The patient complained of headache and pain on one side of the head; temperature was 103½°. There was a history of eczema of the auricle. The doctor inquired if she had been scratching, but a negative answer was given. The auricle was swollen, reddened, and perichrondritis existed. She gave a history of having had attacks of erysipelas in years gone by. Ichthyol was applied, plus the ice-bag. The temperature stayed up for three days, when finally the swelling of the ear subsided; but it went to the other ear. The diagnosis of an erysipelatous cellulitis was then more positive. There was no discharge at any time, and the tenderness has disappeared. Dr. Lederman spoke of the difficulty in arriving at a proper diagnosis in such cases. He thought that if the patient had been a hospital case, she would have been operated upon for mastoiditis.

Dr. JORDAN read a paper entitled "Report of a Fatal Case of Multiple Otitic Abscesses in the Temporal Lobe, with Remarks," which is printed in full on page 186.

Discussion.—Dr. MCKERNON said that the case reported by Dr. Jordan reminded him of one he had seen four years ago, which was reported in the New York Otological Society—that of a boy sixteen years of age. For nine years previous to his admission a purulent discharge had been present. Preparations were being made for operation, when the house surgeon reported that respiration had ceased and the boy was practically dead. It was found that the respiration had ceased, but that the heart was beating very distinctly, the pulse running regularly about 160. The case had then been in the hospital for about two hours. Respiration was not re-established except by artificial means, and then it would immediately stop. The patient died soon after artificial respiration had ceased some half an hour. At the autopsy, a condition somewhat similar to that in the case reported by Dr. Jordan was found present. In the posterior part of the temporo-sphenoidal lobe was a large abscess, the tissue being all soft and broken down; and inferior to this, down in the cerebellum, was

found a second abscess with no apparent communication with the first; there were hemorrhagic conditions in the fourth ventricle and also in the region of the pons. Because of the inability of the patient's friends to speak English, no distinct history could be obtained, and for some time it could not be ascertained where the boy had been brought from.

Dr. McKernon also spoke of another case, on which he had operated two years ago, the patient being a lad of about thirteen years of age. There were no definite symptoms, except occasional attacks of vomiting. He had had a purulent discharge from the ears for several years. At the end of two days it was decided to operate; the boy was chloroformed and the doctor went in above the tegmen. The dura was very much darkened. As soon as the bone over the dura was removed, the dura bulged somewhat. The scalpel was thrust in well anterior. It was followed by only a few drops of blood. It was passed in an upward direction for about one inch. This was rewarded by the oozing of pus from the abscess cavity. The area of the dura was enlarged, the finger inserted, and about ½ oz. of pus was evacuated from the abscess cavity. Thinking that he had evacuated all the pus in the cavity, the doctor at that time decided to use the encephaloscope. It was passed into the cavity, where it met with normal-looking brain tissue—except for a slight congestive area. In turning the encephaloscope upwards and inwards, a little darkened space in the brain tissue was perceived. This was punctured and about ½ oz. of pus evacuated. He believed that without the use of the encephaloscope this second abscess would have been missed. The case made a very good recovery. He agreed with Dr. Jordan as to the advisability of doing both the radical or the mastoid operation and the operation on the brain at the same time, if there were definite symptoms to go by. Sometimes, however, the symptoms are not at all definite—in which case, we must simply wait until the symptoms do develop, before we can go on. With reference to the mode of entering the skull, he thought the most preferable means to obtain free drainage was to enter the floor of the lobe as low down as possible. He thought Dr. Jordan's paper particularly instructive, by reason of the fact that it dealt with a case that showed no early definite symptoms except the retention of pus in the antrum.

Dr. Dench called attention to one or two points in Dr. Jordan's

paper, one being the change of drainage from the gauze which he first put in the wound, to a tube. He had operated upon quite a number of cases of this character, but had been able to save only a very few. He had used all sorts of drainage, and at one time had considered that the kind of drainage used made a considerable difference in the result, although now he believed it depended almost solely on the thoroughness of the operation. He referred to one case which had been under his care, in which he thought the drainage did have something to do with it. There was a temporo-sphenoidal abscess. He found three distinct communicating abscesses. The retention of pus in the separate abscesses was characterized by well-marked symptoms—a rise of temperature and an increase in the cerebral symptoms. In this case, the secondary abscesses which communicated with the main cavity were opened by the examining finger. The finger detected a small passage, and the removal of the finger simply evacuated a considerable amount of pus. There, the gauze drainage did not seem to work so well as the tubes—one large and one small tube, irrigating through the smaller and allowing the return current to flow through the larger tube. The chief thing is to keep the cavity thoroughly clean; he did not think the particular form of drainage made much difference.

One difficulty he had encountered in cases of cerebral abscess had been the appearance of hernia. He believed that one case had been lost on account of a subsequent infection of the pia mater, on account of the large exposure of brain substance. In order to drain an abscess of this kind, he advised making a pretty good-sized dural flap, and after evacuating the abscess to suture the dura, leaving a moderately small opening around the tubes, packing about the tubes with gauze to prevent infection of the pia mater. The doctor was interested to learn, through Dr. Jordan's paper, that there had been a temporarily beneficial effect from lumbar puncture. It occurred to him, he said, that when we have an opening in the cranial cavity it would be a good plan, if no abscess were found, to simply open the lateral ventricles and relieve intracranial pressure in that way. After examining the specimens which Dr. Jordan submitted, Dr. Dench was particularly impressed with the statement made that the abscess was just developing; if it had gone on a few days longer there would have been present an abscess inside of the encephalon. He then

cited a case, occurring in his service of the New York Eye and Ear Infirmary, which had been operated upon about one year ago by Dr. Brandegee, which the latter had reported to the Section. The case came into the hospital suffering apparently from a simple mastoiditis. It was operated upon by Dr. Brandegee, and did very well for a few days, until one day the house surgeon said that the probe went beyond the limits of the antrum. It went, apparently, through the dura. The opening in the dura was exposed and a free incision made through the dura. There was simply a small amount of softened brain tissue evacuated. The cavity was wiped out and packed with gauze; the temperature, which had been 104°, dropped to somewhere about 102°. The case made an uninterrupted recovery, and is alive at the present time.

He believed that early exploratory operation was indicated in all obscure cases, and laid especial stress upon the fact that in a number of cases of intracranial infection, secondary to a purulent inflammation of the middle ear, exploratory operation simply revealed a beginning acute cerebritis, as characterized by a softening of the brain substance in the neighborhood of the tegmen tympani. In addition to this softening, there occurred in most of these cases well-marked signs of increased intracerebral pressure, as evidenced by the immediate bulging of the brain substance through the wound as soon as the dura was incised. This intracerebral pressure was due, in most cases, to an accumulation of serous fluid within the ventricles; it was also partially due to an œdema of the brain substance itself. It seemed possible that early puncture of the lateral ventricle and free incision through the œdematous brain substance might relieve some of these cases. At the present date, however, he had had no success from this method of treatment.

Dr. HOLMES related a case of particular interest, one in which he sent his assistant a hundred miles to secure the brain, so as to have a complete history: A medical student, twenty-five years of age, had suffered from an otitis in the right ear seven years ago, with periods of intermission when the ear was apparently dry and free from any trouble. One day his room-mate reported to the doctor that Mr. X. was in bed, where for two days he had been suffering with terrible pains in his right ear. Upon examination the doctor found the memb. tymp. injected, a slight amount of purulent secretion exuding through an old perforation, and

tenderness over the mastoid, but no swelling; slight elevation of temperature. The patient was put to bed in the hospital, received local and general treatment, and in five days the active symptoms had quieted down. At his urgent request he was permitted to go to his own room, but advised that a radical mastoid operation should be performed at an early date; he, however, flatly refused to entertain the suggestion. The eyes were examined and discs found normal. Four days later, his room-mate again reported the patient suffering from intense earache, but instead of returning to the hospital he had packed his trunk and started for home a journey of about one hundred miles. Nothing more was heard of him for some time, when it was learned that he had become very ill on the train, was unable to sit up, and the conductor had been obliged to telegraph his parents to meet him. He steadily refused to submit to an operation, stating that he would sooner die. About four weeks afterwards the doctor received a request to go at once and operate on the patient. The symptoms as described over the telephone pointed to cerebral complications in a very severe form. On examining the young man, he found the pupils contracted, sluggish, and marked optic neuritis present in both eyes; the reflexes were normal; temperature 103°, and the mental faculties slightly cloudy. He was prepared for operation, and a peculiar feature during the anæsthesia was that the right pupil remained widely dilated throughout the whole of the operation, while the left was normal. Broken-down tissue was discovered ; the lateral sinus seemed to be normal. The tegmen was removed and an abscess was discovered in the temporal lobe. About one-half ounce of pus was evacuated. Dr. Holmes did not feel justified in going farther, and, after packing and dressing the wound, the patient was put to bed, the doctor returning to his home. The patient appeared slightly improved for a day or two, when the symptoms increased and he received another summons. Another operation was performed. The young man was again placed on the table and an opening was made in the squamous portion, where another abscess was found, higher up but in very close proximity to the first. A half-ounce of thick pus was evacuated and communication established with the lower abscess cavity, so as to secure free drainage. The patient died about three days afterwards, and, as stated, Dr. Holmes sent his assistant for the brain. As soon as it arrived, the examination was made at once. In addition to the first and second abscess

cavities already described, there was another abscess, about the size of a hazel-nut, on the convexity near the longitudinal sinus, but no general meningitis.

Dr. H. KNAPP said that he had had the privilege of watching Dr. Jordan's patient, who, when he presented himself for operation, had an optic neuritis. He was operated upon, and in the next three or four days he seemed to be very much better and the optic neuritis was less marked. Then he suffered a relapse. He was comatose; in about ten days he died. At the post-mortem, it was seen that in the swollen, diseased hemisphere there was a diffuse purulent encephalitis with subarachnoidal collections of pus between the convolutions. This case confirmed the opinion held by Dr. Knapp—that the openings which are made from the mastoid and also from the middle ear are apt to be insufficient, although they are of advantage in finding a fistula leading to the abscess; they are apt to produce a temporary improvement, followed soon by a relapse. Dr. Knapp referred to the time when operations for brain abscesses were scarce, and cited a case on which he had successfully operated eleven years ago. The girl was of consumptive parents, with chronic suppuration of the ear for three or four years. Gradually she developed cerebral symptoms with hemianopsia. The diagnosis, abscess in the temporal lobe, was endorsed by Dr. Starr. The skull was opened by a trephine crown of 3*cm* in diameter. Pus immediately was struck by a large hypodermic syringe. The recovery was favorable the first weeks, although a hernia the size of a hen's egg developed. There was no infection, however, but she again began to have fever, and the hernia, which had begun to recede, became larger and bulged out on one side. An incision elicited another abscess. From that time, the child made an uninterrupted recovery, and has been well ever since.

Dr. Knapp said that it was now generally held that too small an opening was one of the greatest mistakes in the treatment of abscess. Also, that we must be prepared for secondary abscesses, since they certainly exist in a goodly number of cases. He did not know whether it was possible to make at once a large enough opening in cases where multiple abscesses existed, and he did not believe that this case of Dr. Jordan's could have been saved, because there was a diffuse encephalitis, but he thought that we should think of another abscess, when the improvement after the first operation was followed by cerebral symptoms again, and

then we should act according to the new indications—enlarge the tympano-mastoid opening, or make a new opening through the squamous portion.

Dr. KRUG reported a case upon which Dr. Gruening had operated some five years ago, the son of a physician. There was a temporo-sphenoidal abscess on the right side. After the operation the child was perfectly well for about five years. Four weeks ago it was brought to the doctor with a very profuse, clear serous discharge from the right ear. Examination of the ear showed a mass bulging into the external canal, which pitted slightly on pressure with the probe. About five days after this, Dr. Gruening was called up by the boy's father and told that the child had developed brain symptoms. The patient was sent to the hospital, where he developed meningitis. A culture was taken of the spinal fluid, and active streptococci found. The boy went into a coma. On the suggestion of Dr. Manges, one of the visiting physicians, a spinal injection of 10*cc* of a solution of lysol was advised, and made, 10*cc* of spinal fluid having been first withdrawn. The boy immediately showed signs of improvement. Culture was again taken, and streptococci were still active, but considerably less than before. On the following day the temperature dropped, the patient improved and has now recovered.

Dr. MCKERNON said that in the past year he had had cases of encephalitis in which he did exactly what Dr. Dench hoped would be done in the future—excised the brain substance. In one of the cases he did a very thorough curetting. There, he used the scissors very freely in getting into the brain substance, cutting off all the discolored and disintegrated brain tissue. Even though there was no meningitis present, it did not seem to have the slightest effect to stay the process.

Dr. JORDAN concluded by saying, that the only regret he had as regarded his conduct of the case reported, was that he had not used the Whiting encephaloscope. From what he had learned, he believed the instrument should be used to find multiple abscesses. In the case referred to, he made so many incisions into the brain that he was sure there was no large abscess. He considered that it was a case of progressive encephalitis, with very little chance at any time for its recovery. He thought, however, that perhaps, if the encephaloscope had been used, more pus might have been obtained and the progress of the encephalitis checked.

REPORT ON THE PROGRESS IN OTOLOGY DURING THE SECOND QUARTER OF THE YEAR 1903.

By Dr. ARTHUR HARTMANN.

Translated by Dr. ARNOLD KNAPP.

(*Continued from page 171.*)

NOSE AND NASO-PHARYNX.

a.—GENERAL.

193. **Felix.** The bacteria of the normal nasal cavity. *Wien. med. Wochenschr.*, Nos. 14 and 15, 1903.

194. **Moeller.** Remarks on the lateral adenoid vegetations in the naso-pharynx, with a description of a new set of instruments for their removal. *A. f. O.*, vol. lvii., p. 178.

195. **Uffenorde.** On the histology of the hyperplastic pharyngeal tonsil, with regard to tuberculosis and indications for operation. *A. f. O.*, vol. lviii., p. 47.

196. **Ziller.** The relations of pharyngeal tonsillar hypertrophies to the palate, skull, face, and nose. *Inaug. Dissert.*, Breslau.

197. **Potapow.** The third tonsil in sucklings. *Wratschebnaja Gaseta*, No. 15, 1903.

198. **Kantorowitsch.** A case of enuresis healed after removal of adenoid vegetations. *Prakt. Wratsch*, No. 40, 1902.

199. **Viollet.** On the histological structure of adenoids. *Jour. de l'anat. et de physiologie*, 1903, p. 97.

200. **Fischer.** The symptoms produced by adenoid vegetations, their consequences and complications. *Ugeskrift for Læger*, No. 17, 1903.

201. **Calamido** and **Bitelli.** On respiration of the frontal sinus in man. *Archiv. ital. di otologia*, vol. xiv., No. 2.

193. A survey of the literature on the subject without bringing out any new facts. WANNER.

194. A frequent cause for an unsuccessful result after the adenoid operation is furnished by the vegetations situated

laterally — usually in Rosenmueller's fossa, though sometimes farther down the lateral wall on the tubal ridge or behind the plica salpingopharyngea. In two hundred cases these were found present in nine. The symptoms resemble those of ordinary adenoids. The diagnosis is usually made by digital examination, though sometimes it is only possible to do so after removal of the mass. For their removal, a special instrument, devised by Professor Mygind, is recommended, which resembles Kirstein's knife, but with a lateral deviation of the handle. HAENEL.

195. The author has not been able to verify Trautmann's statement that the soft form of adenoids is the more vascular. He was not able to find a connection between the soft form and tuberculosis, nor a relation of the various consistencies of the pharyngeal tonsil to various ages. As against other authors, the writer found the enlargement of the tonsil in two cases out of sixty-four to consist of a hyperplasia of the submucosa, and especially of the glandular elements. In general, the hyperplastic process is found in the substantia propria.

The cysts in the pharyngeal tonsil are described, and also tuberculosis of the pharyngeal tonsil, which was found present microscopically in three of sixty-four cases. In two, a few tubercle bacilli, situated in giant cells, were found present. In all three cases, after extirpation of the tonsil, the tuberculin test was made, twice with negative and once with positive result. The different results from the tuberculin reaction correspond to a different histological condition in the extirpated tonsil. In two cases with negative reaction, the tuberculosis changes were limited to the substantia propria. In the third case, the sub-mucosa was found tubercular. In the first two cases, the tuberculous focus was removed out of the body by operation, while in the latter case other tubercular manifestations remained. In this case, according to the author, the pharyngeal tonsil was the primary focus. The tuberculin test is of great diagnostic value to show whether the tuberculous infection was localized in the extirpated tonsil or was already disseminated. He recommends that every extirpated tonsil should be examined microscopically for tuberculosis, and, if possible, then the tuberculin test should be tried. In each case, the indication for operative removal of adenoid vegetations should be increased, so that cases are operated upon, not so much on account of severe symptoms, but from the possibility of tuberculosis changes being present. HAENEL.

196. In order to obtain serviceable results, it is necessary to undertake similar measurements and to examine in various ages. Ethnological peculiarities can explain the divergence of the results of various investigators. The tendency to enlarged pharyngeal tonsil is often inherited: in one family, for instance, there were five brothers and sisters; in another, a father and five children were attacked. Hypsistaphylia is not a necessary sequence of a pharyngeal enlargement or the consecutive interference with nasal respiration. It is, however, more frequent in this disease than when the breathing is normal. Hypsistaphylia is not always associated with dolichocephalia, leptoprosopia, or leptorrhinia, and a uniform coincidence of the two last forms does not always exist. HOELSCHER.

197. An examination of one hundred cases has led the author to conclude that disturbance in drinking and swallowing and dyspepsia in sucklings are frequently caused by hypertrophy of the pharyngeal tonsil. Examination is only possible by anterior rhinoscopy. He does not operate before the fifth month. These children stand cocaine very well. After-hemorrhages have not been observed. The first symptoms of rachitis often disappeared after the removal of adenoid vegetations, together with the dyspepsia. SACHER.

198. The removal of the adenoids in a boy twelve years of age caused a prompt healing of the malady which had existed for six years. SACHER.

199. Pharyngeal tonsils which recur have not always the usual appearance, but present a raspberry granulation surface. This form has been carefully examined microscopically. The peripheric part consisted of adenoid tissue, the central of vascular connective-tissue; the eosinophile cells were unusually numerous, uniformly distributed throughout the entire tonsil, while Mastzellen were only found in the central part. It cannot be stated at present whether the eosinophile cells are formed in the tonsil or emigrate out of the blood. OPPIKOFER.

200. The material examined consisted of 500 cases from the clinic of the Kommunal Hospital in Copenhagen from March, 1899, to January, 1902. Most of the patients were between seven and nine years of age, only a few were over twenty. The symptoms produced by occlusion of the naso-pharynx were as follows: Nasal stenosis, anosmia, and rhinolalia clausa, catarrh of the respiratory

passages, aural affection, but not the distinct symptoms—enuresis, headache, disturbance of speech, etc. Nasal stenosis was present in 84 of the cases, anosmia in 27, rhinolalia clausa in 80; acute and chronic catarrh was very frequently present. Laryngeal stenosis was frequently combined with adenoid vegetations, and appeared to stand in some etiological connection. Ear symptoms were present in 66 % of the cases; chronic purulent otitis in 6.4 %; sequelæ were present in 4.6 %. According to the histories, a much larger proportion of cases of aural suppuration were present, namely, 20 %. JOERGEN MOELLER.

201. In a patient where the anterior wall of the frontal sinus was open, following traumatic fracture, the authors investigated the respiratory changes in this sinus. From these experiments, they conclude that the air in the frontal sinus takes part in each case in nasal respiration. RIMINI.

b.—METHODS OF EXAMINATION AND TREATMENT.

202. **Hirschmann.** Endoscopy of the nose and of the accessory cavities. A new method of examination. *Arch. f. Laryng.*, vol. xiv., No. 2.

203. **De Stella.** Some notes on the employment of adrenalin and on its physiologic action. *La Presse otolaryngologique Belge*, 1903, No. 5.

204. **Mignon.** A new method of applying adrenalin in rhinology. *Arch. internat. d'otol.*, etc., 1903, pp. 361–363.

205. **Strubell.** On yohimbin as anæsthetic. *Wiener klinische Wochenschrift*, 1903, No. 24.

206. **Menzel.** On treatment of respiratory closure of the alæ nasi. *Münch. med. Woch.*, 1903, No. 18.

207. **Walsham.** On some operations for rectifying crooked and depressed noses. *Lancet*, April 4, 1903.

208. **Tilley.** A case illustrating an operative procedure for the relief of almost complete adhesion of the soft palate to the posterior pharyngeal wall—the result of tertiary syphilis. *Proc. Laryng. Society*, March 6, 1903.

209. **Gamlen.** Treatment of lupus by X-rays and ultra-violet rays. *Brit. Med. Journ.*, June 5, 1903.

210. **Sequeira.** Further observations upon the treatment of rodent ulcers by X-rays. *Brit. Med. Journ.*, June 5, 1903.

211. **Ingals.** Clamp forceps for removal of naso-pharyngeal tumors. *Journ. Amer. Med. Assoc.*, June 6, 1903.

212. **Monosmith.** A new nasal speculum. *Journ. Amer. Med. Assoc.*, April 4, 1903.

213. **Douglass.** Septal fallacies. *The Laryngoscope*, April, 1903.

202. In order to examine the cavity of the maxillary antrum, the author has modified Nitze's cystoscope, so that it can be introduced through the ordinary opening in the alveoli. After

experiments on twenty-one patients, the author believes that endoscopy is of great diagnostic importance, and describes a number of conditions which he found present. BRUEHL.

203. (1) Adrenalin increases vascular pressure only after intravenous injection.

(2) Absorption from the mucous membrane is too weak and too slow to produce a general effect upon the vascular pressure.

(3) Injection underneath the skin or mucous membrane has only local action on the vaso-constrictors.

(4) Consequently, a result cannot be expected in the case of hemorrhages whose source cannot be reached (pulmonary hemorrhages). BRANDT.

204. 0.03 adrenalin (1: 1000) is first mixed with 3.0 vaseline oil, and then 12.0 white vaseline, 3 drops oil of geranium, and 15.0 of lanolin are added. This salve is rubbed into the mucous membrane with a cotton applicator. The astringent appears somewhat less quickly, but remains considerably longer than after the application of the ordinary adrenalin solution, and the consecutive dilatation of the vessels is avoided. This is recommended in acute rhinitis, in secretoria rhinitis, and after cauterization of the mucous membrane. Hemorrhages are less frequent when this has been used in operations on the nose.

OPPIKOFER.

205. The experiments were made on healthy and diseased persons. With yohimbin, paralysis of sensation occurs with hyperæmia—so that the turbinates did not decrease in size. The author, therefore thinks this drug is indicated in operations on the lower and middle turbinates. In general, two to three applications of a 1 % solution sufficed to produce tactile anæsthesia in the mucous membrane of the nose, pharynx, larynx, and mouth, though the action does not appear to go deep. A 1 % solution is not sufficient for the electro-cautery, and the drug is therefore only to be used for a cold snare. In the twenty cases observed by the author, severe hemorrhage did not occur either during or after the operation; the agent had no deleterious effect.

WANNER.

206. During this aspiration of the alæ nasi, paraffin was injected in the outer wall of the nose, with satisfactory results in two cases. SCHEIBE.

207. WALSHAM describes the following operations:

1. Forcible straightening.
2. Subcutaneous osteotomy along the naso-maxillary.
3. Subcutaneous suture of the nasal cartilages.
4. Wiring the cartilage to the nasal bones.
5. Injection of paraffin subcutaneously.
6. Shifting the septum bodily at its junction with the floor of the nose.
7. Formation of a septum from the maxillary crest.

ARTHUR CHEATLE.

208. The patient had been twice operated upon before coming to TILLEY, who, after separating the soft palate from the pharyngeal wall, passed a strong silver wire from before backwards, through the soft palate, close to its junction with the hard palate, and about half an inch from the middle line. The distal end was then made to repierce the soft palate close to its fore margin, and from behind forwards. The free ends were then brought forward, exerting firm traction on the soft palate, and fastened round an incisor tooth. A similar procedure was then adopted on the other side of the palate. One wire cut out in about ten days, the other in a fortnight. The house surgeon for three weeks had passed his finger into the naso-pharynx and exerted firm traction forwards upon the soft palate.

ARTHUR CHEATLE.

209. This is a long paper, giving details of technique and the results in cases of lupus of the nose. The paper is illustrated.

ARTHUR CHEATLE.

210. SEQUEIRA has treated over one hundred cases. In his paper he deals with: the changes produced in the growth; the question of recurrence; the selection of cases and the conditions which favor success. Two excellent results of rodent ulcer of the nose are recorded. ARTHUR CHEATLE.

211. The naso-pharyngeal clamp forceps has the general form of Loewenberg's, or rather Michael's forceps, since the blades are longer and much more curved than in the former. The curved portion is two inches long, each blade is protected at the back and outer side by a piece of ivory to avoid the production of a short circuit in using the galvano-cautery snare, and the roughened faces of the blades are each provided with four short, sharp spikes to prevent slipping. The handles can be locked.

M. TOEPLITZ.

212. The instrument is to be held in the left hand for both nares, with the ball of the thumb on the screw head, whereby the blades open vertically, raising the tip of the nose without touching the mucous membrane. The upper blade is much shorter and is placed somewhat back of the lower blade; it is also hooked slightly upward. The blades are attached to the shanks at right angles. M. TOEPLITZ.

213. DOUGLASS advises against breaking the septum into minute fragments with the forceps, as heretofore practised in straightening operations, and instead to separate the triangular cartilage. There is no danger of setting up a meningitis. A single incision is preferable to a crucial one. In all cases the superior maxillary spine should be broken, which is done by chisel either through the upper lip or through the nose.

M. TOEPLITZ.

c.—TUMORS OF THE NOSE.

214. **Baber.** A case of tumor of the vestibule of the nose. *Proc. Laryng. Society*, March 6, 1903.

215. **O'Kinealy.** Microscopic section of localized psorospermosis of the mucous membrane of the septum nasi. *Proc. Laryng. Society*, April 3, 1903.

216. **Beco.** Two tumors of the nose. *La Presse otolaryng. Belge*, 1903, 2.

217. **Kimball.** Angioma of nasal septum. *Annals of Otol., Rhinol., and Laryngol.*, March, 1903.

218. **Coakley.** The treatment of abscess of the septum, with special reference to the prevention of subsequent deformities. *Annals of Otol., Rhinol., and Laryngol.*, March, 1903.

219. **Wright.** Notes from the throat department of the pathological laboratory of the Manhattan Eye and Ear Hospital. *Amer. Journ. Med. Science*, June, 1903.

220. **Waggett.** Case of primary tuberculosis of the nasal septum. *Proc. Laryng. Society*, May 1, 1903.

221. **Montague and Lake.** A case of nasal calculus weighing forty-eight grains. *Lancet*, April 26, 1903.

214. A woman, aged twenty-six years, had had a tumor filling the anterior half of the right vestibule, of three months' growth. It was the size of a small bean, and was attached by a very thin pedicle to the outer wall, close to its anterior end, and about $\frac{1}{8}$ inch from its external edge. The tumor was composed of much young spindle-celled tissue, traversed by numerous large lymphatic channels and covered by skin. ARTHUR CHEATLE.

215. A married male Mahometan, aged twenty-two, a worker in rawhides, had had a growth in the left nostril for three years,

which bled frequently. It was removed with forceps, and there was no trouble for six months, when it recurred and was removed by a native barber, but a few months later it recurred again. A small vascular pedunculated tumor, about the size and shape of a large pea, was then seen growing from the mucous membrane at the anterior and upper part of the cartilaginous septum. It was then removed with forceps and cold snare, but recurrence soon took place and the patient was lost sight of. A long microscopical report is given. ARTHUR CHEATLE.

216. (1) Telangiectatic mucous polyp inserted in the vestibule to the inner surface of the alæ nasi.

(2) A large malignant tumor of alveolar structure, which occluded the anterior left nasal canal and the naso-pharynx. It was removed with dependent head by rhinotomy. Recovery, without disfigurement; after a short time, a fatally terminating relapse. Perforation through the base of the skull.

BRANDT.

217. KIMBALL found in a man, fifty-six years of age, who has suffered for several years from nasal obstruction and hemorrhages, a large bilobular growth, pedunculated and hanging from the right nasal cavity, situated on the septum and pulsating, while in the left nostril, slightly lower down on the septum a sessile, a single-lobed bleeding growth was seen. Both tumors, separately removed under extreme hemorrhages, were composed of blood-vessels, held together by connective tissue and interspersed with round and spindle-shaped cells. They were angiomata; no recurrence took place. M. TOEPLITZ.

218. In order to prevent depression or flattening of the nose after evacuation of bilateral abscesses of the septum, in which a portion of the cartilage is lost and the septum is broadened through the separation of the two layers of the muco-perichondrium, COAKLEY advised the use of the Simpson tampon after incision, and at the end of a week a nasal splint is substituted.

M. TOEPLITZ.

219.

I. A rapidly recurring bleeding polyp of the septum nasi appearing twice in a woman, each time at the seventh month of pregnancy.

In a woman aged twenty-five years, a round vascular growth sprang from the inferior and posterior edge of a perforation which, consisting of very vascular granulation tissue, rapidly recurred after extirpation and was then larger than before. It

was now removed radically with the underlying cartilage. About one year later the growth had returned during the seventh month of pregnancy; it was removed and rapidly recurred. It appeared covered by degenerated epithelial cells, under which was a layer of hyaline degeneration of the connective tissue. The growth is made up of loose œdematous connective-tissue, a large number of mononuclear round cells traversed by very numerous capillaries. There is considerable inflammatory action, but no proof of the malignant nature of the growth. After delivery of the child the growth has been rapidly disappearing.

II. Papillary adenomatous hypertrophy of the mucous membrane of the septum.

A man, aged thirty-five years, had ten years ago an abscess of the frontal sinus, which ruptured spontaneously and was curetted through an outer opening. Since then polypi of the nose and frontal sinus developed. The growth removed from the right side of the septum was situated at its anterior third, at the junction of the triangular cartilage with the vomer, and was in contact with the floor of the nose. It was bleeding moderately and recurred since the operation. Microscopically there was a very corrugated surface, lined by a thin layer of columnar epithelium; the stroma was loose and œdematous; the epithelium was columnar, and a number of rings were separated from the surface in the substance of the growth.

III. A cyst in the lymphoid tissue of the pharynx.

The specimen came from the glosso-epiglottic fossa. Several contiguous microscopic lymph nodes embedded in the loose connective tissue were the seat of the cyst formation. At the larger end almost the entire centre of a lymph node is seen to be taken up by the dilated lymph space; at the small end the beginning of another cyst is seen forming. These are true lymphatic cysts.

IV. Effusion of serum into the nasal mucosa in coryza.

Besides cysts, in acute coryza, the dilatation of lymph spaces is due to sudden and excessive exudation of serum from the blood-vessels into the stroma weakened in the process of chronic inflammation. M. Toeplitz.

220. A man aged thirty-five years, in failing health, suffered pain in the nose and frontal regions for two years, and exhibited an extensive superficial ulceration of the mucous membrane of

the left side of the nasal septum, an inch in diameter, with a yellow and granular base. The anterior edge was heaped up and a specimen taken from that portion showed tuberculous tissue with well-developed giant cells. Examination of the lungs showed increased vocal resonance over the right apex in front and behind. ARTHUR CHEATLE.

221. A woman, aged thirty-six years, complained of offensive discharge from the left nostril, a disagreeable taste in the mouth, and inability to breathe through the nose for five years.

The nucleus consisted of a cherry-stone, the crust being formed of earthy carbonates and phosphates. ARTHUR CHEATLE.

d.—OTHER DISEASES OF THE NOSE.

222. **Dunbar.** On the etiology and specific treatment of hay-fever. *Berl. lin. Wochenschr.*, No. 24 ff., 1903.

223. **Thost.** New experiments on hay-fever and its treatment. *Münch. med. Wochenschr.*, No. 23, 1903.

224. **Grunert.** A case of rhinogenic pyæmia terminating in recovery. *Münch. med. Wochenschr.*, No. 14, 1903.

225. **Moure and Brindel.** On the treatment of ozæna with injections of paraffin. *Neue Therapie*, 1903.

226. **Sacher.** On rhinoliths. *Wratschebnaja Gaseta*, 1903.

227. **Bentzen.** A case of congenital atresia of the choanæ. *Ugeskrift for Læger*, No. 20. 1903.

222. This paper relates further investigations of the author in his attempts to obtain a specific curative agent against hay-fever. After a short historical introduction, the experiments on the etiology of hay-fever are described, which have convinced the author that certain albuminous bodies contained in the pollen of various grasses by a toxin action produce hay-fever in predisposed individuals. DUNBAR has attempted to produce an antitoxin for this pollen-toxin by infecting horses with a certain amount of pollen-toxin. In some of the animals, severe general symptoms set in, and the serum of these animals showed, after repeated injections, anti-toxic faculties. The pollen-toxin mixed with this blood serum did not cause any irritation on the mucous membrane of patients suffering from hay-fever, while in a pure state it causes very severe irritation. Experiments with hay-fever produced naturally, and not artificially through pollen-toxin, were not possible at the present time. The few observations appear to confirm the results of the laboratory experiments. In a number of cases, if the antitoxin was instilled in the form of

a few drops in the nose and in the eye on onset of the first irritations, the attack of hay-fever was cut short. The author as yet does not think it wise to apply the serum subcutaneously, inasmuch as it can in some hay-fever patients produce very unpleasant symptoms of irritation. MÜLLER.

223. THOST reports on Dunbar's paper, and confirms the statement that the pollen-poison in predisposed persons causes symptoms of hay-fever to appear, while in those persons who are not predisposed—but suffering from a nervous coryza—no symptoms were produced. The paralyzing of the pollen-poison with Dunbar's antitoxin was always possible for at least one day. He believes that the remedy, even if it cannot cure the first attacks of hay-fever, nevertheless is of great differential diagnostic importance. SCHEIBE.

224. In a young girl, ten years of age, severe pain in the head and in the left eye suddenly set in. Four days later there was a discharge of pus from the left nose, severe swelling of the back of the nose and of the eye, as well as high remitting fever to 40° C. At operation, pus was found in the frontal, ethmoid, and maxillary sinuses. High fever continued for some time. After it had decreased and the wound as well as the nasal discharge had completely healed, an abscess developed on the right and on the left arm. No chill. Recovery. SCHEIBE.

225. Twenty patients with ozæna were treated after an application of cocaine by the injection of paraffin into the submucous tissue of the turbinates and of the septum; and the authors believe that if it is possible to restore to the nose its normal calibre recovery is assured. Of the cases remaining under observation, 62 % were healed, 26 % were improved, and 11 % remained unchanged. BRUEHL.

226. The nucleus of a rhinolith in the nose of a girl sixteen years of age proved to be a sunflower seed. This had probably been in the patient's nose for ten years. It was situated deep in the nose, behind a spur, and was extracted by a hook-shaped probe. SACHER.

227. A woman thirty years of age, had never been able to breathe through her nose; there was no sense of smell; the nasal cavities were filled with pus; the turbinates were normal. Seven *cm* behind vestibule a firm commissure was encountered. Posterior rhinoscopy showed that the choanæ were normal, but immediately

in front of them there was a yellowish-white osseous-like wall covered with normal mucous membrane; above, symmetrical on the two sides, there was a small depression. The teeth were normal; the palate was well-shaped, but very high. A passage was made with the galvano-cautery, and a good result was obtained. MOELLER.

THE SOFT PALATE, PHARYNX, AND MOUTH CAVITY.

228. **Roemheld.** On isolated chronic contractions of the soft palate. *Münch. med. Wochenschr.*, 1903, No. 13.

229. **Rousseaux.** 1. Myxoma of the palatal tonsil. 2. Voluminous fibroma of the larynx; extraction by natural ways. *La presse otolaryngologique Belge*, 1903, No. 2.

230. **Boulai.** Two cases of large pulsating vessels of the pharynx. *Arch. internat. d'otol.*, etc., 1903, p. 381.

231. **Burkhard.** The operative treatment of dangerous bleeding after tonsillotomy. *Wiener klin. Wochenschr.*, 1903, No. 22.

232. **Jonquière.** A case of secondary gangrenous angina. *Correspondenzblatt f. Schweizer-Aerzte*, 1903, p. 248.

233. **Iwanow.** On the angina of Vincent, and its complications. *Medicinskoje Obosrenje*, 1903, No 2.

234. **Stolkind.** Four cases of ulcerous Vincent's angina. *Djetskaja Medizin*, 1902, No. 6.

235. **Pegler.** Chronic spasms of the soft palate, causing objective noises in the pharynx in a woman aged twenty. *Proc. Laryng. Society*, April 3, 1903.

236. **Steward.** A case of chronic contraction of the palate, adductors of the cords, and certain other muscles. *Ibid.*, March 6, 1903.

237. **Pegler.** A case of chronic spasm of the muscles of the palate and pharynx, causing entotic tinnitus in a lady aged thirty. *Ibid.*, March 6, 1903.

238. **Griffith.** Salivary fistula caused by stenosis of the parotid duct. Operation; recovery. *American Medicine*, April 4, 1903.

239. **Cobb.** Peritonsillar abscess. *Annals of Otol., Rhinol., and Laryngol.*, March, 1903.

240. **Quinlan.** Malignant tumors of the naso-pharynx. *The Laryngoscope*, May, 1903.

228. In an old lady with a neuropathic tendency, an apoplexy was followed by clonic half-sided contracture of the soft palate and slight paresis of the same. In the beginning there was some disturbance of speech. The upper respiratory passages and the ear were normal. SCHEIBE.

229. 1. ROUSSEAUX reports a case of myxoma of the left palatal tonsil, of which, up to the present time, only five have been reported in literature (Masse, Rivière, McKenzie, Haug, and Cozzolino).

2. The laryngeal fibroma is interesting on account of its size. It had a wedge shape, 35*mm* long, 10–18*mm* broad, and was attached with its thick end to the anterior commissure 1*mm* above the right vocal cord. It was removed with the cold snare.

BRANDT.

230. In two patients fifty and fifty-five years of age, respectively, a pulsating vessel was accidentally discovered, having a thickness of a goose quill, in the right posterior pharyngeal corner. In one of the cases, the pulsation ceased on pressure exerted upon the cervical vessels. OPPIKOFER.

231. BURKHARD believes that the number of operations in threatening hemorrhage will be decreased by adrenalin—an opinion which, according to the reviewer, is probably fallacious, inasmuch as we get cases of arterial hemorrhage. The author gives a drawing of the anatomical relationships, and comes to the conclusion that it has not thus far been definitely settled which vessel is injured, and whether it is always the same. He believes that ligation of the common carotid is without reason, even though ligation of the external carotid, especially in cases where the facial or lingual arteries are injured, is indicated. The method previously advocated by Nicoladoni, to attack the tonsils from the external surface, is recommended. The cutaneous incision begins 1*cm* behind and below the insertion of the auricle, and extends in the form of an arc down and forwards one finger above the large cornu of the hyoid bone. The various tonsillar vessels are ligated, the stump of the tonsil is pressed outwards, and, after opening the pharynx, is extirpated; the pharynx is then closed by suturing the palatal pillars. WANNER.

232. A man, fifty-two years of age, has been quite ill for a number of years, more probably due to leucæmia rather than to tertiary syphilis—possibly both diseases were present. Six weeks before death, gangrene of the lungs set in; five weeks later, the left tonsil became gangrenous. OPPIKOFER.

233. The author found, as a frequent complication, a polymorphous exanthem and articular pains; rarely there were albuminuria abscesses, and even appendicitis. In addition to Vincent's bacilli, streptococci were also found in the membranes, which are supposed to be due to complications. Complications were most frequent in those cases with severe stomatitis or glossitis.

SACHER.

234. The three cases were children varying in age from four and one-half to eight years; the fourth was an adult. In the latter, the clinical picture of the lacuna angina was present; in the first three the angina resembled diphtheria, and was characterized by a very marked fetor. In all the cases, the individuals were feeble and anæmic, a condition which appears to be predisposed to Vincent's angina. SACHER.

235. The patient had entotic tinnitus in the left ear for two months. The uvula moved upwards at the rate of 240 contractions a minute. The adductors of the cords contracted simultaneously, but every few seconds the cords remained widely abducted for a second or so. Adenoids were present.
ARTHUR CHEATLE.

236. A woman, aged fifty-two years, had for eighteen months had difficulty in speech and inability to walk without assistance. Ataxic symptoms were present besides the muscular contraction.
ARTHUR CHEATLE.

237. A clicking sound, heard mainly in the right ear, was concurrent with chronic spasm of the posterior pillars of the fauces. The rate of the contraction per minute was 42. The clicking was audible without the diagnostic tube in the ear. Distinct movement at the mouth of the Eustachian tube was visible through the nasal meatus. There was also simultaneous adduction of the arytenoids and vocal cords ceasing on phonation, and contraction upwards of the velum and uvula.
ARTHUR CHEATLE.

238. The patient, a male of seventeen years, had a salivary fistula upon the left side of his face. A sinus was found running upward and backward for about an inch, caused by an ulcerated tooth. The sinus was ligated within the mouth with a curved needle, and a puncture was made below the duct at a point inside the mouth opposite that of the other corresponding opening of the duct of the right side. M. TOEPLITZ.

239. COBB summarizes his views as follows: Three locations have been claimed as possible situations of peritonsillar abscess. First, the pharyngo-maxillary fossa; second, the supratonsillar fossa; and third, the areolar tissue about the tonsil. From the anatomic conditions and the clinical appearances, the site of the abscess is believed to be the areolar tissue. The incisions used are an upward and backward one, with a straight knife for an-

tero-superior cases, while for postero-superior cases an outward incision between the posterior pillar and the tonsil with a right-angled knife is advised. M. TOEPLITZ.

240. QUINLAN carefully analyzed the entire literature with reference to growths primary in the naso-pharynx only, and makes therefrom the following deductions: (*a*) Rapidly growing fibromata of the naso-pharynx, clinically malignant, histologically sarcomatous, are not essentially malignant. (*b*) True sarcomata with tendency to metastases also occur, but rarely. (*c*) Cancer may occur as epithelioma, usually as adeno-carcinoma, but not primarily as true cancer. Treatment by injection, electrolysis, extirpation, ligation or excision of arteries, and the use of chemical rays is fully dwelt upon. M. TOEPLITZ.